NOVEMBER 7, 1931

Railway Age

FOUNDED IN 1856

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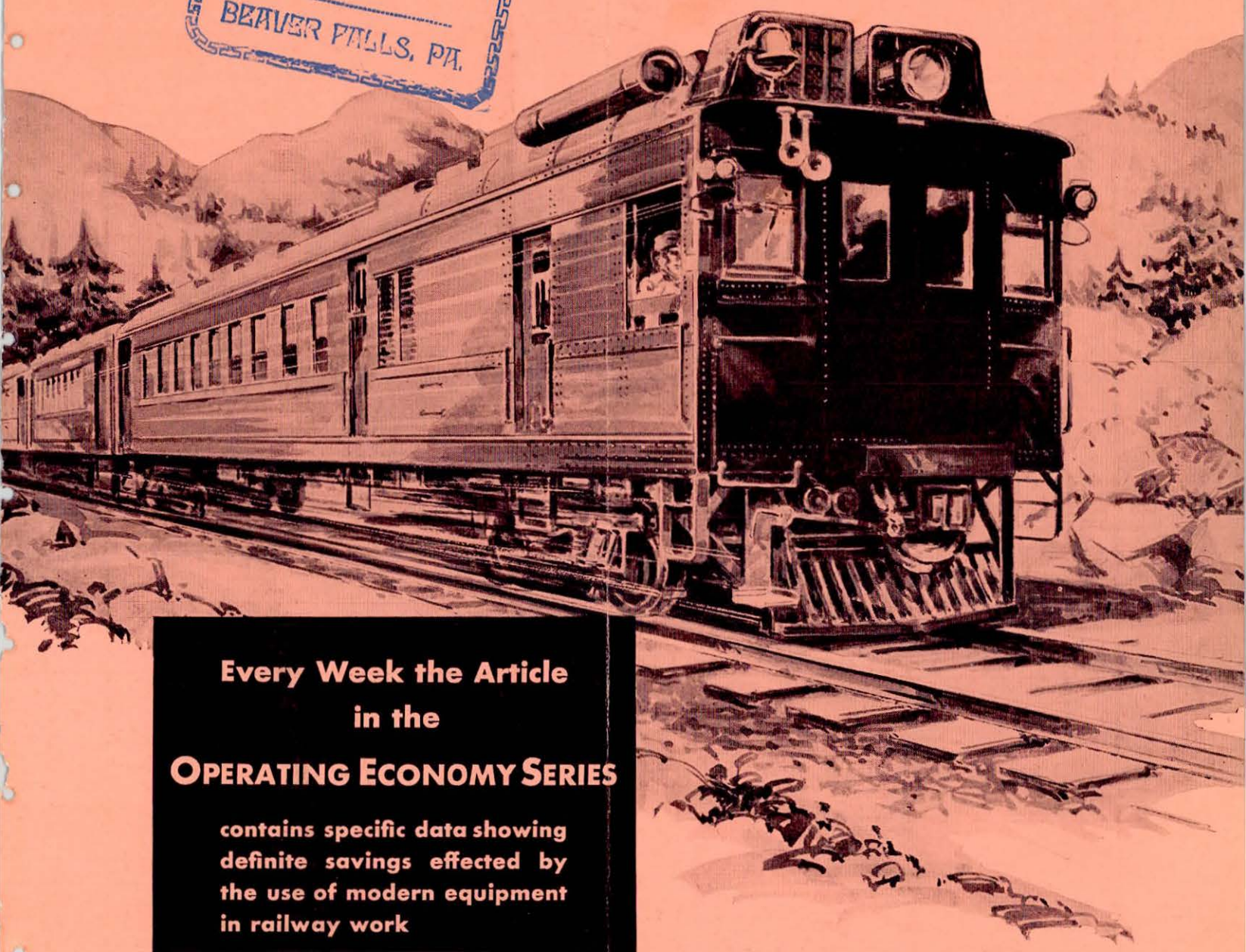

Every Week the Article in the

OPERATING ECONOMY SERIES

contains specific data showing definite savings effected by the use of modern equipment in railway work

In This Issue

Rail Motor Cars for Economy

Next Week

Modern Highway Crossing Protection Reduces Operating Costs

Alphabetical Index to Advertisers—Page 62

Buyers Directory of Advertisers—Page 56

PULLMAN-BUILT RAIL MOTOR CARS

Good Rail Motor Car design requires the elimination of all unnecessary weight and the utilization of proper bracing in order to impart to the unit its greatest capacity and to reduce vibration to the minimum. In collaboration with our patrons we have developed such designs and they are being successfully applied.

Let us figure with you on your Rail Motor Car requirements.

PULLMAN
CAR & MANUFACTURING CORPORATION

General Offices: Chicago, Ill.

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Washington Sales Office,
805 Munsey Bldg.,
Washington, D. C.

Birmingham Sales Office,
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Address communications to 30 Church St., New York City.

MINIMIZING MAINTENANCE WITH G-R-S Electric Car Retarders

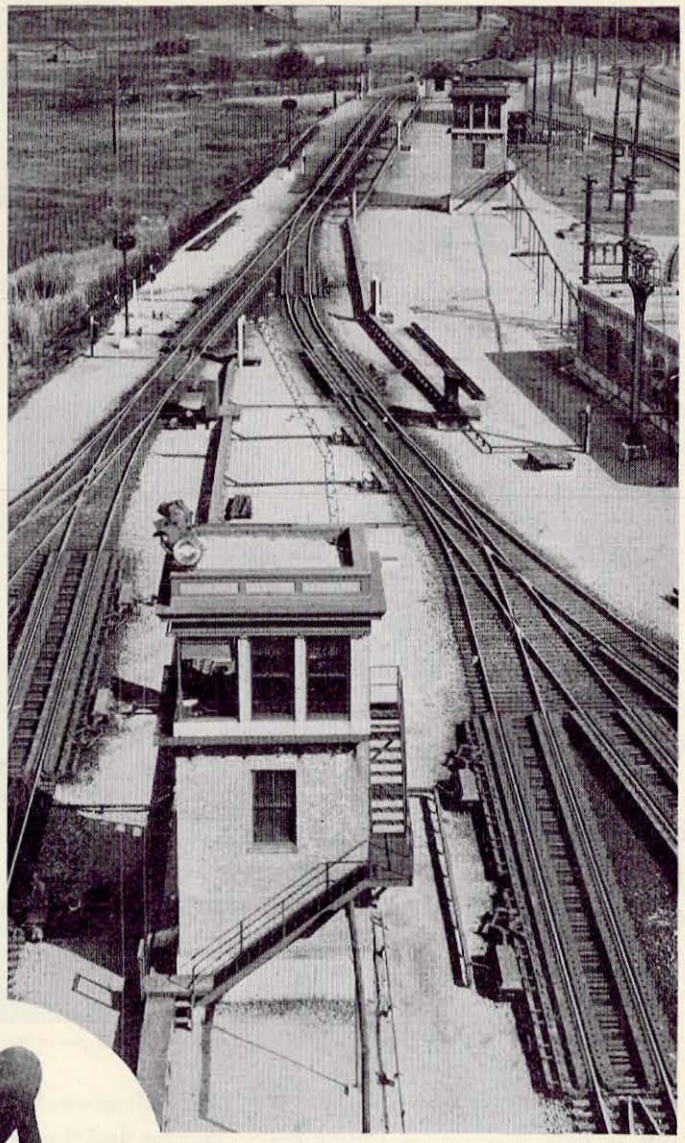
It is a well-known fact that Car Retarder Systems are effecting substantial savings. Have you considered the savings to be obtained in maintenance and power costs when using G-R-S Electric Car Retarders?

G-R-S Type B Car Retarders have minimized maintenance. Their design is such that all retarder parts are accessible and tamping facilities reduce track maintenance to a minimum. Shoes are easily replaced and All-Electric operation reduces trouble in zero temperatures.

High grade alloy steel parts are used in their construction. Hardened steel bushings and pins are all lubricated with a high pressure system. Cadmium plated bolts and nuts prevent corrosion and a special spring arrangement takes up bearing play and eliminates bearing shock.

Power costs are lower. It's All-Electric. There are less losses in this type of power transmission. With the G-R-S Type B Retarder, energy is used only in the proportion to the work done.

G-R-S Electric Car Retarder Systems are now operating in many locations with maintenance and power costs at a minimum. When considering equipment for your next installation, why not consult our Engineering Department? Our retarder specialists are at your service.



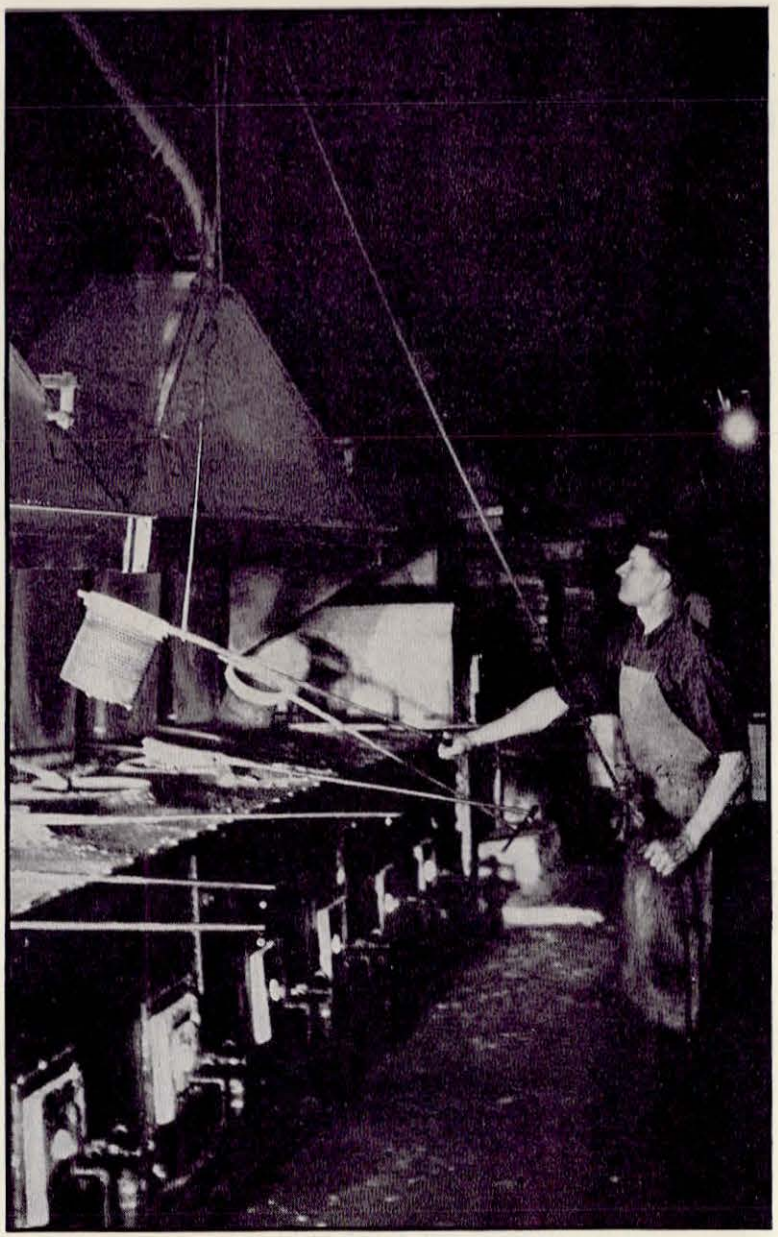
GENERAL RAILWAY SIGNAL COMPANY

ROCHESTER, N. Y.

New York Chicago St. Louis A-863

Affiliated Companies' Offices: Montreal London Paris Tokyo Barcelona Melbourne Calcutta Buenos Aires

"Cancel the Inspection . . . Buy 100% R B & W Stock"



A process in the manufacture of R B & W Bolts and Nuts. BOURKE-WHITE PHOTO

Why a great railroad system discontinued professional factory inspections of its R B & W purchases

A GREAT American railroad system is now buying its entire requirements of slotted nuts from R B & W. When this railroad decided to make R B & W its exclusive supplier, it also decided to discontinue inspections at our factory prior to shipment.

Its experience in always receiving an acceptable product from us, and its confidence that we would continue to produce the railroad's requirements satisfactorily, led to the cancellation of its professional factory inspection service and the consequent saving in the cost of the product.

Slotted nuts are the most important type of nuts used by the railroads. They must be made very accurately in size and must possess uniform strength. The quality of R B & W slotted nuts is such that they are known as the standard by railroads everywhere.

To be sure of the best in all types of bolting material, specify R B & W products. If you have a problem involving the use of bolting material, consult the R B & W Engineering Service.

RUSSELL, BURDSALL & WARD BOLT & NUT CO.

ROCK FALLS, ILL. PORT CHESTER, N. Y. CORAOPOLIS, PA.

Sales Offices at Philadelphia, Detroit, Chicago, San Francisco, Los Angeles, Seattle, Portland, Ore.

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Railway Age

With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name Registered U. S. Patent Office

Vol. 91 November 7, 1931 No. 19

In This Issue

Rail Motor Cars for Economy ..... **Page 698**

This article, No. 18 in the Operating Economy Series, tells how necessary train service on light-traffic lines can be provided by motorized units at half the cost of operating steam trains.

The Motor Truck—A Threat and an Opportunity **701**

J. R. Turney, vice-president, St. Louis Southwestern, speaking before the Associated Traffic Clubs of America, analyzes the problem of highway competition and outlines the opportunity of the railroads "again to attain the dominance in transportation which they formerly held."

Centralized Control of Freight-Car Interchange Advocated **707**

T. W. Demarest, general superintendent motive power, Western Region, Pennsylvania, in an address to the Car Foremen's Association of Chicago, points out the advantages of such a centralized system.

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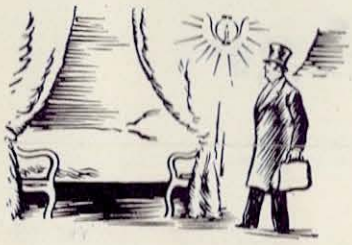
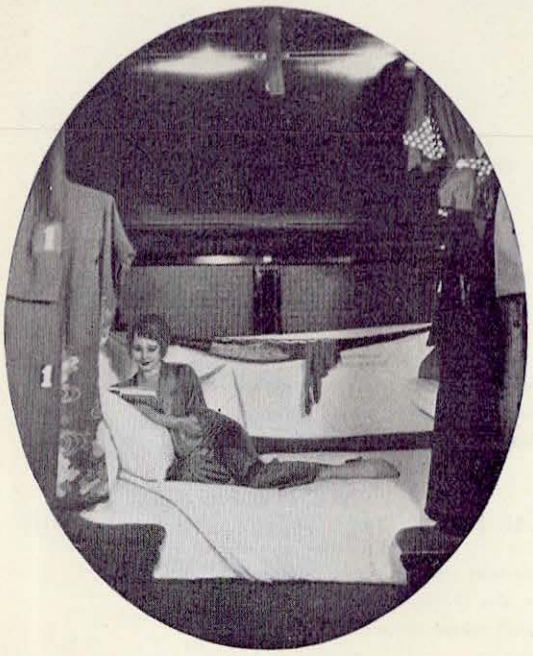


They went to bed by

ON SLEEPER



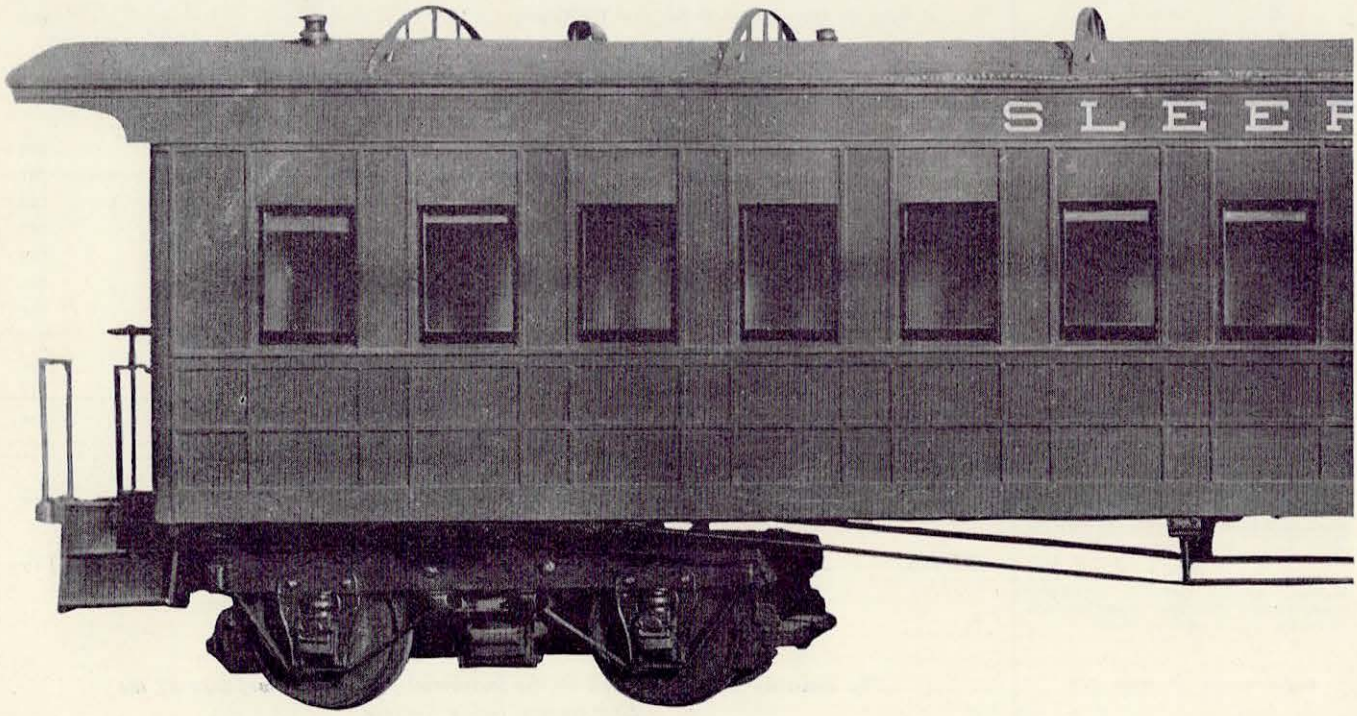
LUXURIOUS EASE *characterizes the Pullmans of today. The flickering candles are forgotten . . . bright, steady electric lights have taken their place.*

. . . and were thrilled by such luxury in railway travel

OLD No. 9 was the first sleeping car. It was built by George Mortimer Pullman in 1859. Why it was called No. 9 no one seems to know. At any rate, a sleeper with a wood-burning stove at either end, and three candles to light it, was just about the last word at that time.

Many a stovepipe hat ran afoul of the flat, low-hung ceiling of this historic sleeper. But no matter how crude it may seem to us now, this wooden coach was Pullman's initial effort to make railroad travel a comfort instead of a grimy, harrowing experience.

Pullman was born in 1831. It could well be said this date also marked the birth of the luxurious Pullman car of 1931. For it was the persistency of Pullman that



candle light

NUMBER 9

finally won over the railroads to changing their bridges and station platforms to fit his coaches.

Seventy-two years have changed the springless berth into a comfortable bed . . . sooty, smelly travel into air-conditioned luxury . . . candle light into electric. Playing an important rôle in the rail service of today is the storage battery. And because of the importance of having thoroughly reliable performance and operating economy at all times the majority of roads trust in Exide Batteries.

There is an Exide for every type of railroad work. And behind each Exide is the experience of 43 years of battery building, and a reputation of the world's largest manufacturers of storage batteries for every purpose.

Exide

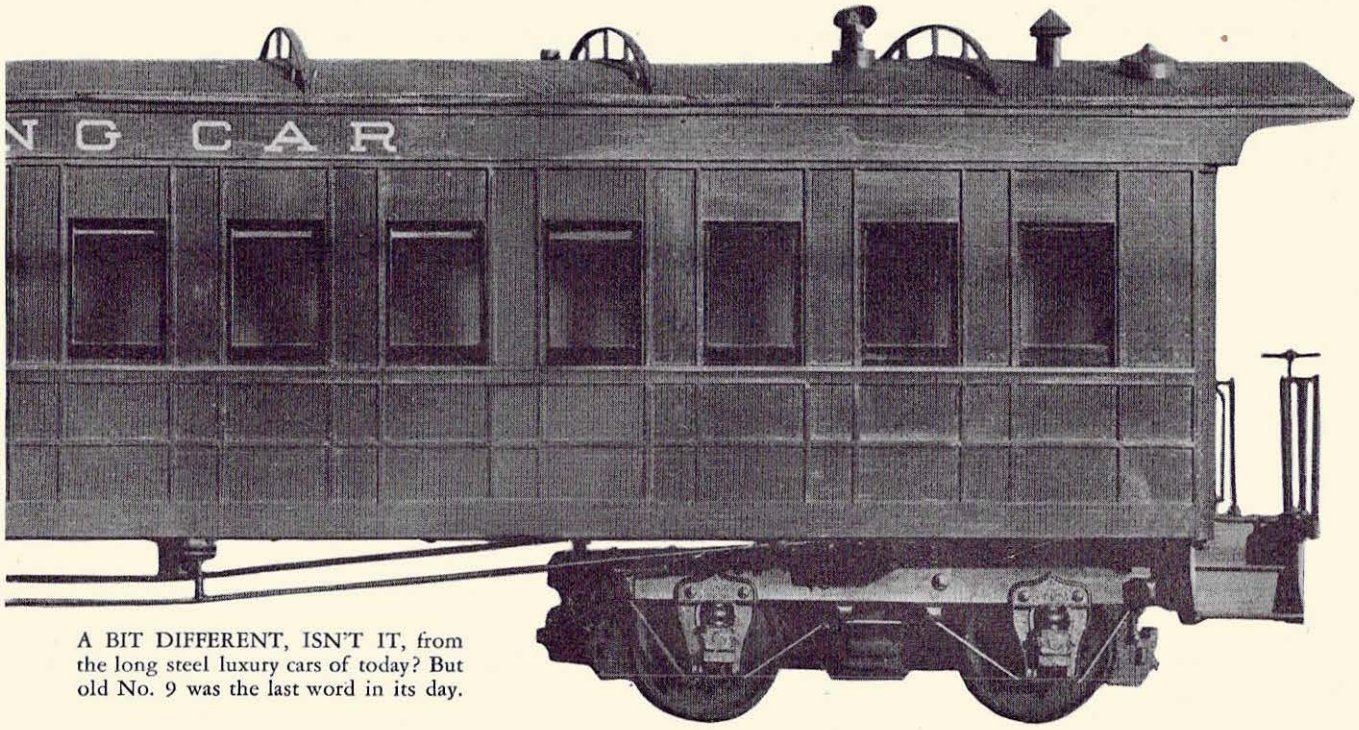
BATTERIES

FOR EVERY RAILWAY USE

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE

Exide Batteries of Canada, Limited, Toronto



A BIT DIFFERENT, ISN'T IT, from the long steel luxury cars of today? But old No. 9 was the last word in its day.

ECONOMY—IS THE WATCHWORD

TODAY'S standard of wheel economy and safety is the single plate Chilled Tread Wheel of TODAY.

Chilled Tread Wheels

From both the chemical and physical standpoint possess inherent properties found in no other wheel.

The wearing surfaces of flange and tread have sufficient bearing power to carry the heaviest loads without permanent deformation, and have a maximum resistance to abrasion.

The metal of the tread and flange has a maximum wearing value.

The wearing surface of the flange and tread causes the least abrasion to the rail.

It is easily applied and removed, and requires a minimum of shop appliances.

Annealing practices followed by the manufacturers assure soft plates giving greater resistance to the thermal stresses developed by the most severe brake action, and soft hubs which are easily bored and give minimum mounting cost.

The single plate chilled tread wheel* is another way of saying *"Wheel Economy."

Better Every Year

A slogan and a fact based upon definite laboratory and foundry programs.

FOR THE 70-TON CAR THE 850-LB. CHILLED TREAD WHEEL—THE HEAVIER THE CAR CAPACITY THE GREATER THE FACTOR OF SAFETY.

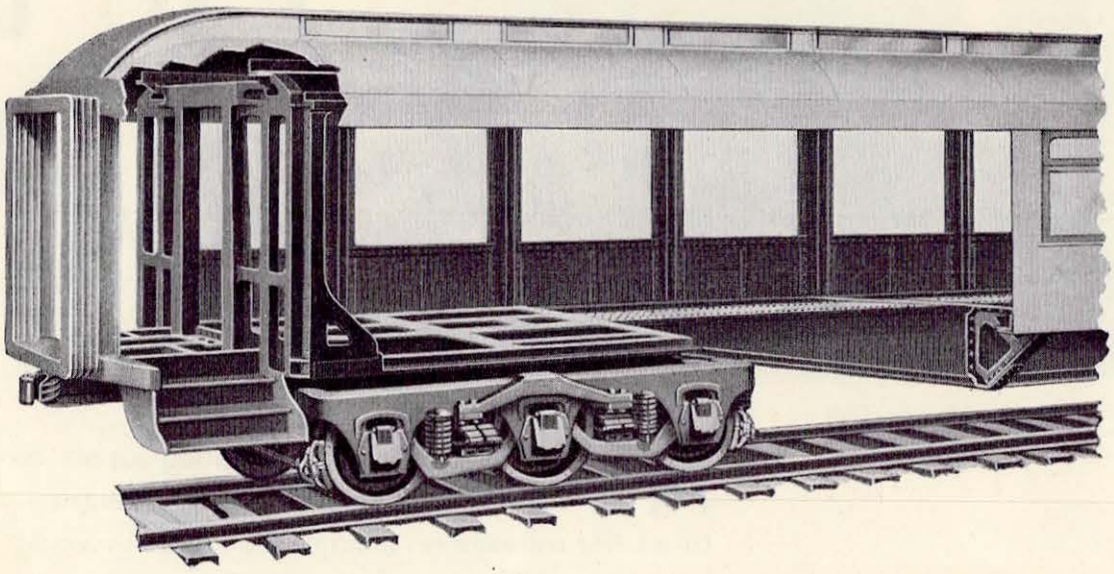
CHILLED TREAD WHEELS

A. R. A. Standards

650-lb. for 30-ton Cars—700-lb. for 40-ton Cars—750-lb. for 50-ton Cars—850-lb. Wheel for 70-ton Cars

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
1847 McCORMICK BUILDING, CHICAGO, ILLINOIS

Railroads Provide the Safest Form of Passenger Travel



VIEW OF PASSENGER CAR EQUIPPED WITH COMMONWEALTH PLATFORM AND DOUBLE BODY BOLSTER CASTING, UPRIGHT END FRAME, AND SIX-WHEEL INTEGRAL PEDESTAL TRUCK

Commonwealth Cast Steel Platforms and Upright End Frames

CONTRIBUTE TO SAFETY OF PASSENGERS

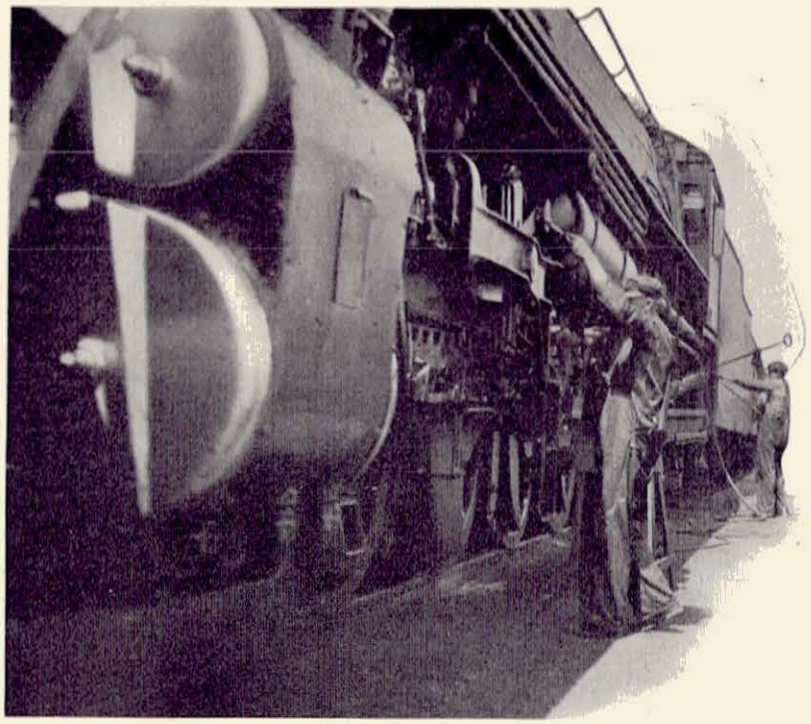
ASSURE STRONGEST END CONSTRUCTION OF CAR AND PREVENT TELESCOPING

REDUCE MAINTENANCE EXPENSE OF ENTIRE CAR

GENERAL STEEL CASTINGS CORPORATION

COMMONWEALTH PRODUCTS

EDDYSTONE, PA. GRANITE CITY, ILL.



SERVICING A LOCOMOTIVE ON A LONG RUN, AT AN INTERMEDIATE STOP

The Long Run—

A LOCOMOTIVE today is called upon to make three, four—even seven or eight—times the mileage on a single run, that it would have made ten or more years ago.

The Long Run cuts out the expense of intermediate engine terminals; reduces the number of locomotives necessary to handle a given tonnage; increases locomotive mileage per month, and saves fuel and other costs; **BUT---**

the Long Run requires free steamers with ample speed capacity and at all times absolutely dependable under the most strenuous operating conditions. The small-wheeled, small-boilered locomotives of comparatively few years ago have no place in such service.

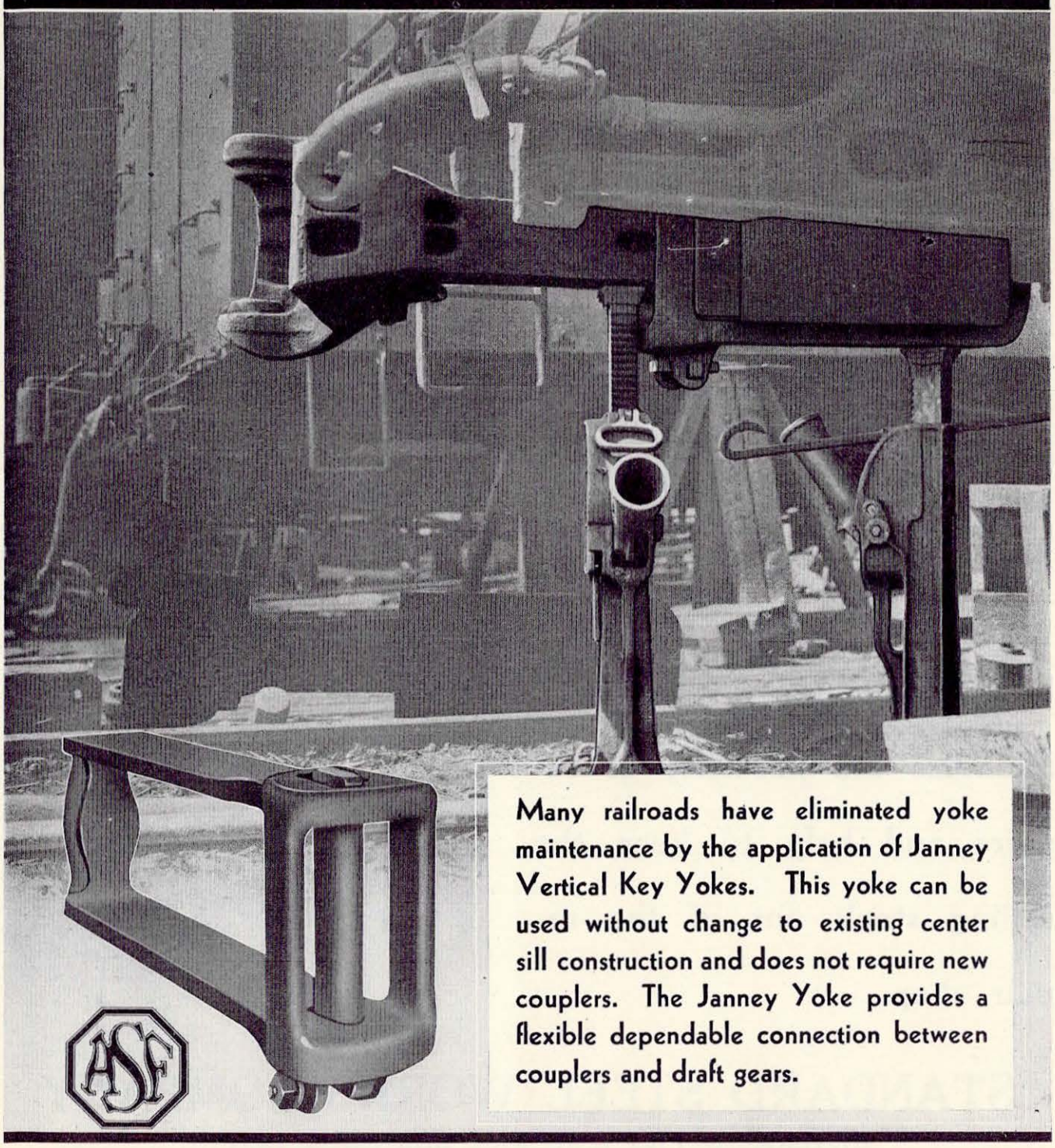
It takes Modern Locomotives to make money these days!

THE BALDWIN LOCOMOTIVE WORKS 1831 1931

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA

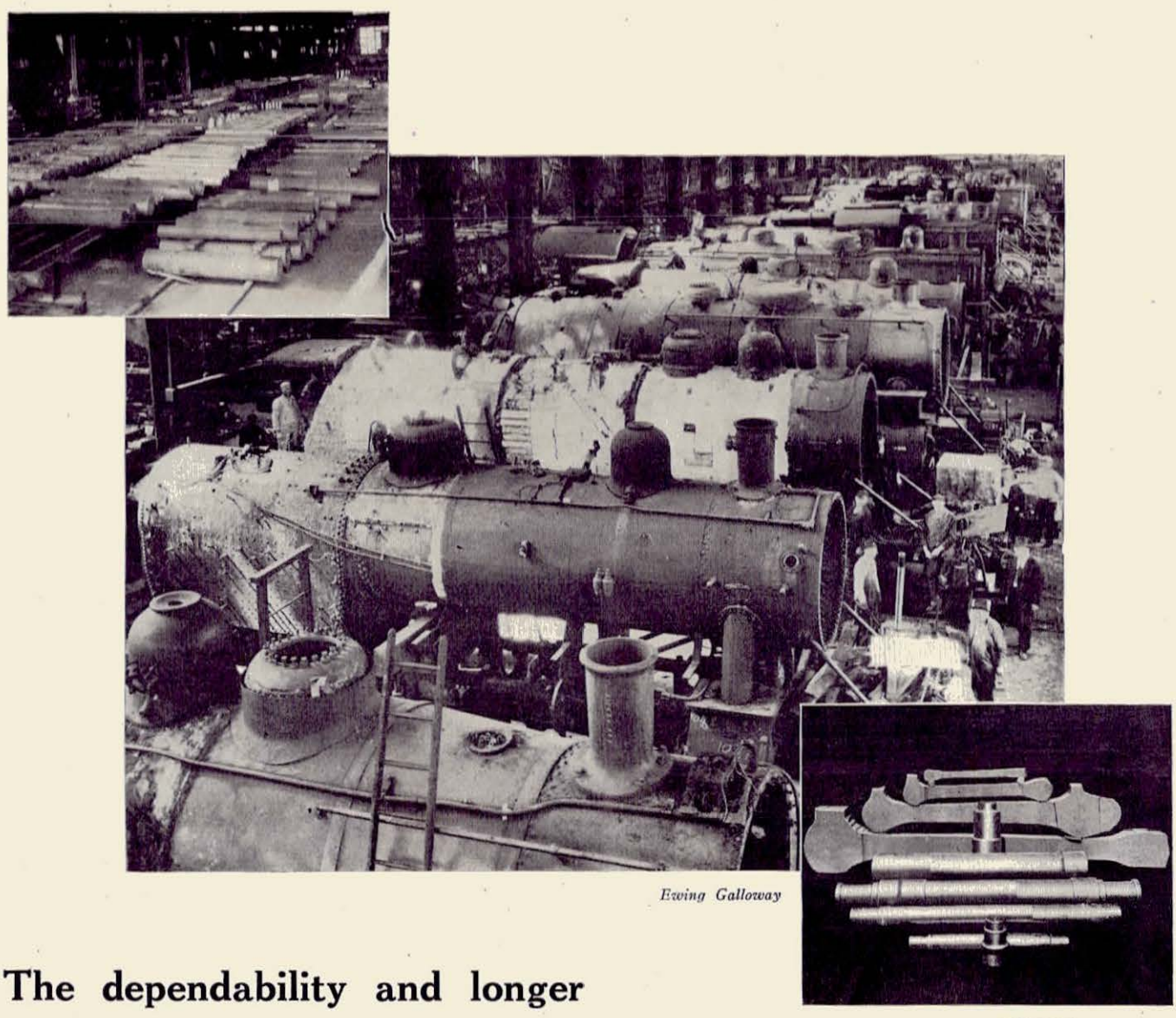
Eliminate YOKE MAINTENANCE



Many railroads have eliminated yoke maintenance by the application of Janney Vertical Key Yokes. This yoke can be used without change to existing center sill construction and does not require new couplers. The Janney Yoke provides a flexible dependable connection between couplers and draft gears.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS



Ewing Galloway

The dependability and longer life of "Standard" forgings minimize the necessity of repairs and help to keep the rolling stock out of the repair shop.

Tires
Rolled
Wheels
Steel Tired
Wheels
Forgings
Steel
Castings
Billets

STANDARD STEEL WORKS COMPANY

GENERAL OFFICE & WORKS: BURNHAM, PENNA.

CHICAGO
NEW YORK
PHILADELPHIA

ST. LOUIS

AKRON
PORTLAND
SAN FRANCISCO

Protect the Right of Way Against Troublesome Streams

with ARMCO

PAVED INVERT

PIPE

Triple paved Armco Paved Invert Pipe rendering faithful service under a railroad in Georgia.

Keep the roadway firm and dry for safe, fast travel — by "harnessing" troublesome streams in Armco Paved Invert Pipe.

An investment in this unusual drainage material is a distinct economy. Armco Paved Invert Pipe not only puts streams under control but it also combats erosion—Nature's most destructive weapon.

Years of actual service prove this—prove the ability of Armco Paved Invert Pipe to effectively resist the wear of sand, silt, stones and boulders, and to outlast unprotected drainage structures.

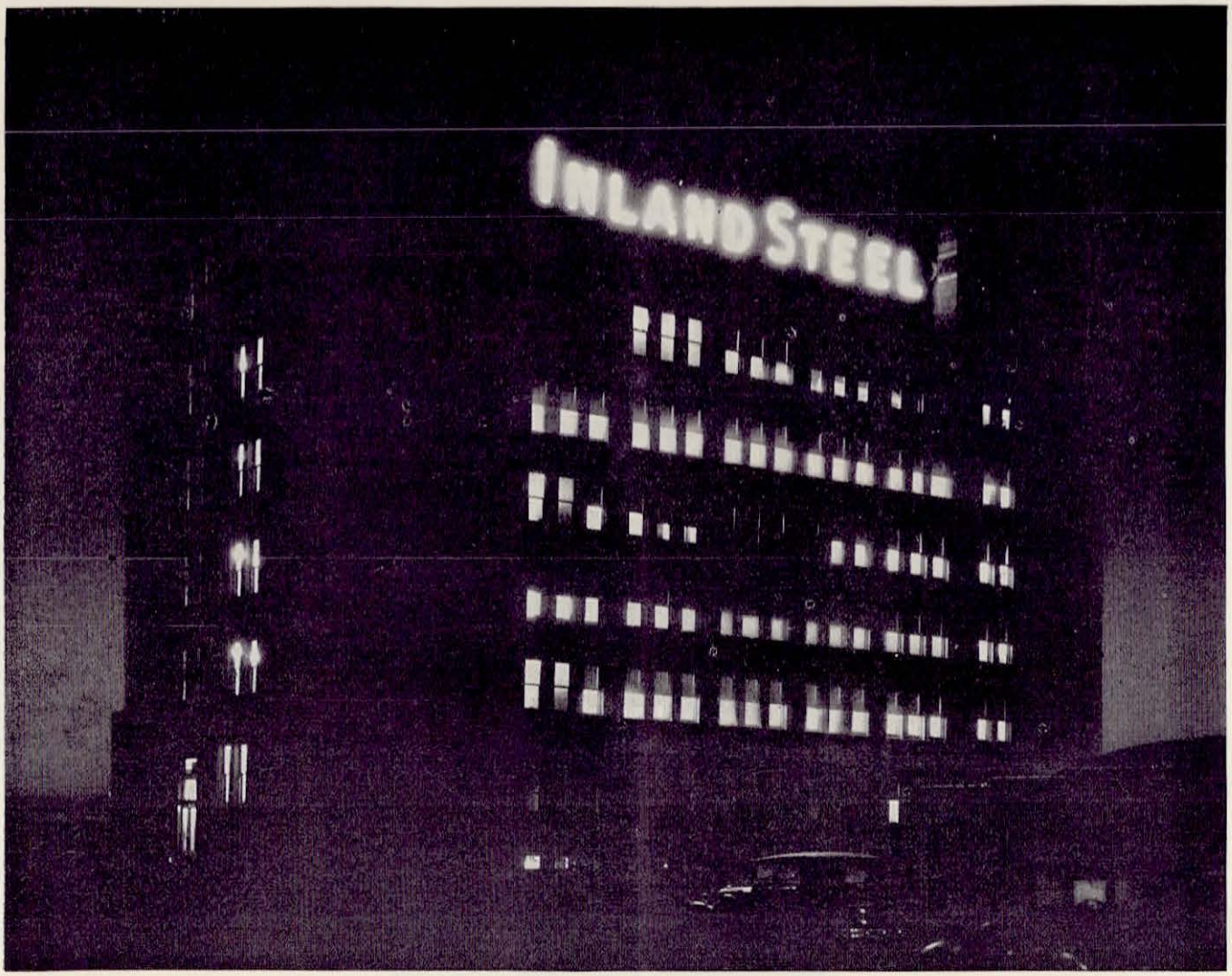
Armco Paved Invert Pipe is basically Armco Corrugated Pure Iron Pipe with pavement. This again means something in point of durability, for Armco Corrugated Pipe has an unequaled record to date of 25 years continuous culvert service under the railroads of United States and Canada.

Therefore Armco Paved Invert Pipe has a much longer service life. Its use on any railroad means lifetime, low cost, security against troublesome streams.

Have before you the latest engineering data on this unusual product for stream enclosures. It is yours for the asking. Write today.

Armco culverts and drains are manufactured from the Armco Ingot Iron of the American Rolling Mill Company and always bear its brand.

ARMCO CULVERT MANUFACTURERS ASSOCIATION, *Middletown, Ohio*



The Inland Administration Building at Indiana Harbor seen by night.

•Able

To furnish a comprehensive list of rolled steel products to the correct specifications for each particular requirement.

To make a delivery date and meet it—or to beat it in a pinch.

To control quality with micrometric precision—because detailed control tests are made at every step from Inland's own mines and quarries to the finished steel.

To work shoulder to shoulder with our customers, to understand and intelligently share their problems. INLAND STEEL COMPANY, 38 South Dearborn Street, Chicago.

• ***TEST THIS ABILITY***

INLAND STEEL

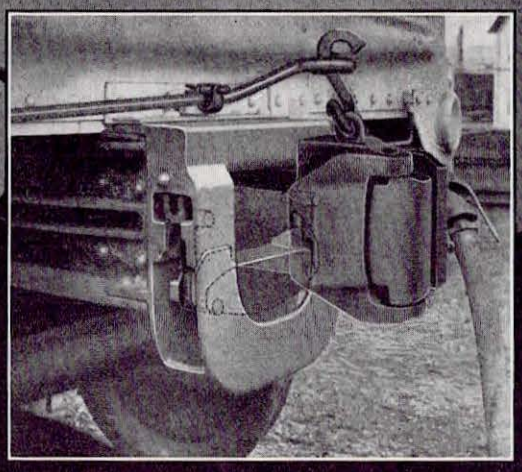
ABLE SERVANT OF THE CENTRAL WEST

Sheets Bands Bars Plates Structurals

Track Accessories Rails Rivets Billets Piling

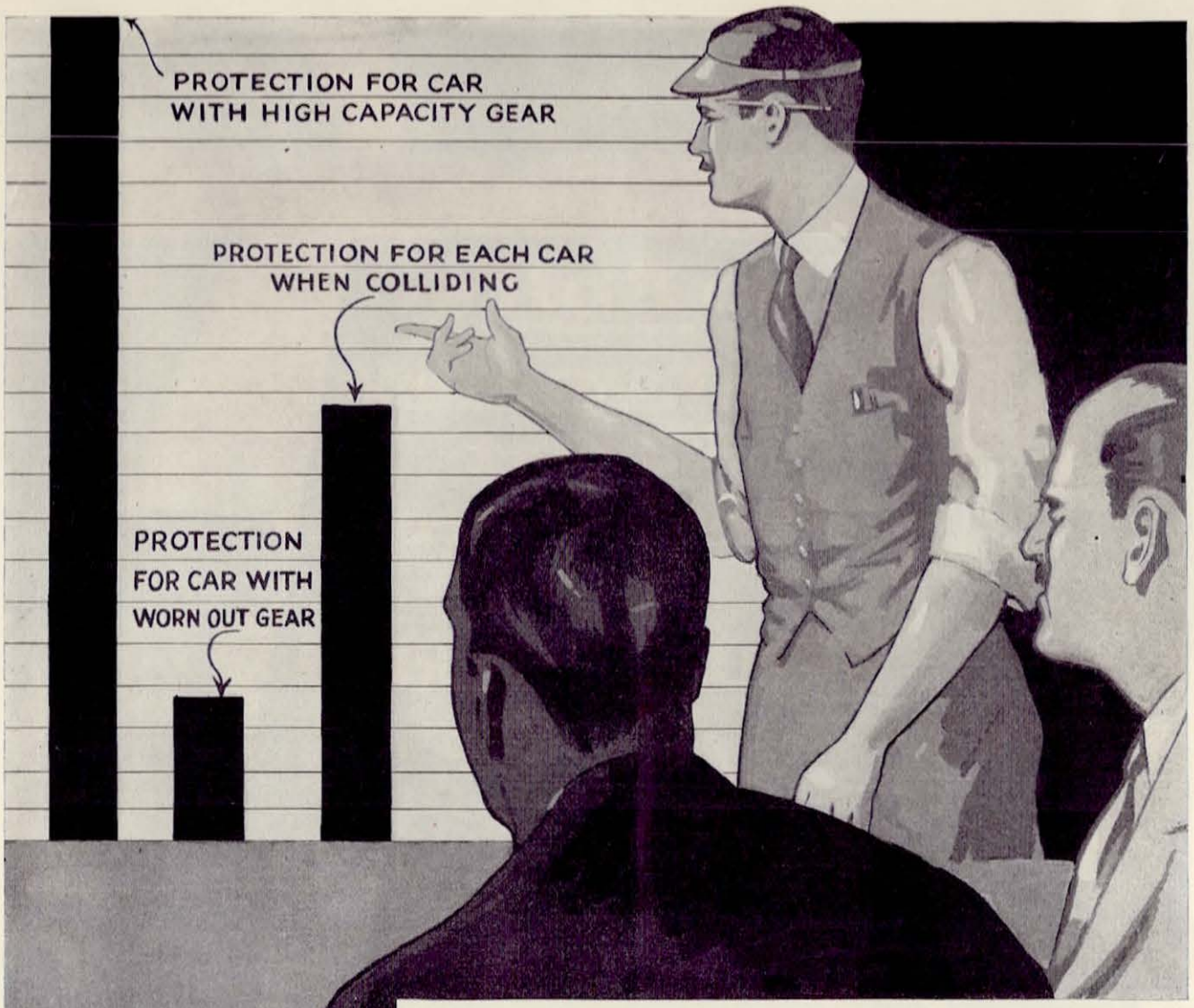
No Bolts-

Drop Forged Links Support The Carry Iron of the UNION CENTERING DEVICE



UNION METAL PRODUCTS COMPANY

NEW YORK - CHICAGO - ST. LOUIS - WASHINGTON
RICHMOND - HOUSTON - SAN FRANCISCO - KANSAS CITY - MONTREAL



HIGH CAPACITY GEAR PROTECTION NULLIFIED

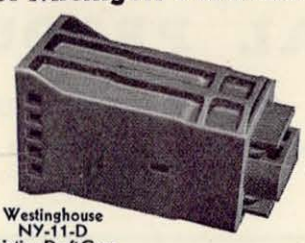
The necessity of high capacity draft gear on new heavy cars is acknowledged.

But these cars often receive less than the protection anticipated when operated with cars having inadequate gears, because part of the protection of the high capacity gears is sacrificed to protect the cars with inadequate gears.

Every car in service should have good draft gears.

CARDWELL-WESTINGHOUSE CO.
332 So. Michigan Avenue » » Chicago, Illinois

Cardwell L-25 Friction Draft Gear



Westinghouse NY-11-D Friction Draft Gear

Cardwell-Westinghouse Friction Draft Gear Type F-2

How to cut SMALL TERMINAL operating costs

The operating expense of small terminals can be reduced substantially by the use of modern coal, sand and cinder handling machinery. Installations of Fairbanks-Morse equipment have proved convincingly that retention of obsolete methods is false economy. Thus, by the use of F-M Automatic Locomotive Coalers many railroads have reduced coal handling costs in small terminals and out-of-the-way points to as little as 3 cents a ton. Similar economies apply to the use of F-M sand and cinder handling equipment. Savings sufficient to pay for the equipment in a short time are reported by roads that have adopted these modern methods.

Fairbanks-Morse manufactures locomotive coalers (conveyor and skip types), sanding stations and cinder handling machinery to suit every requirement, large or small. You will find complete information about this guaranteed equipment of practical interest, especially at this time when it is imperative that unnecessary operating expense be avoided. Your request for literature or an interview with an F-M representative will not obligate you.

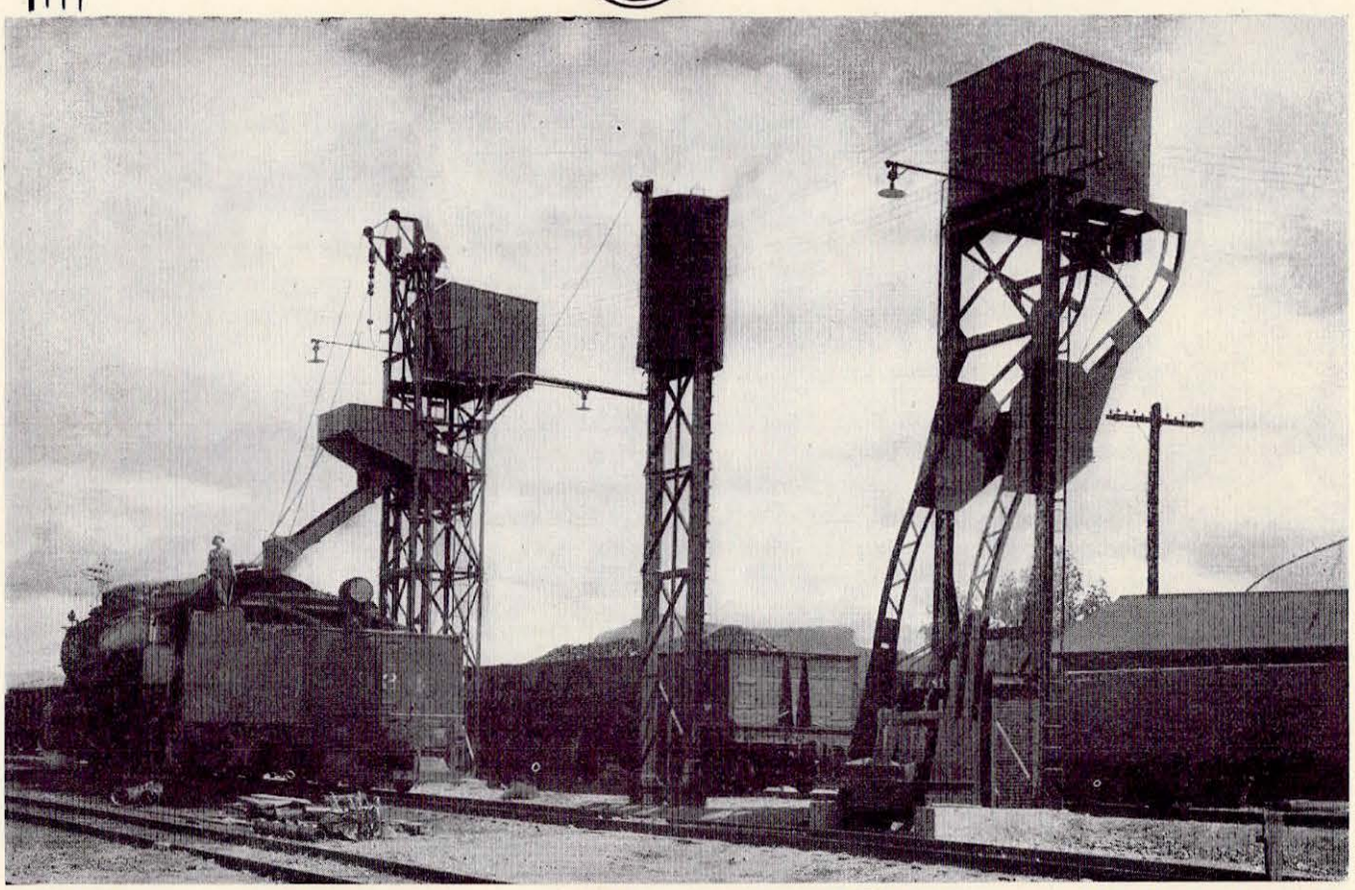
FAIRBANKS, MORSE & CO., 900 S. Wabash Ave., Chicago

32 branches at your service throughout the United States

FAIRBANKS-MORSE

AUTOMATIC LOCOMOTIVE COALERS

Roads that have replaced obsolete methods with Fairbanks-Morse coal, sand and cinder handling equipment report savings sufficient to pay for the machinery in a short time.



POWER · PUMPING · AND · WEIGHING · EQUIPMENT

5551—RA 21.83

Boston and Maine yard, Mechanicville, N. Y., illuminated with G-E Form L-24 floodlighting projectors

Correct Yard Lighting MUST Meet Three Demands

IT MUST:

(1) Enable operators to observe cars approaching from the hump.
(2) Enable cars to be seen clearly as they pass through the retarders.
(3) Enable operators to follow cars readily until they have at least cleared the fouling point of the yard tracks.

(FROM REPORT OF COMMITTEE ON ILLUMINATION OF THE AMERICAN RAILWAY ASSOCIATION)

GENERAL ELECTRIC floodlighting projectors, installed according to the recommendations of the G-E Illuminating Engineering Laboratory, meet all these demands — and more. The resulting illumination prevents injury to men and damage to cars and goods; it discourages thieves and establishes practically daylight working conditions.

The superbly efficient L-24 projector — that can be relamped from the rear — whose material and construction withstand chemical action and hard usage — is still the ideal unit for classification yards. But if, for any reason, a lower-priced unit is required, the new L-34 is recommended. This projector is relamped from the front, the whole unit being swung around and reset by an ingenious device at the trunnion and base.

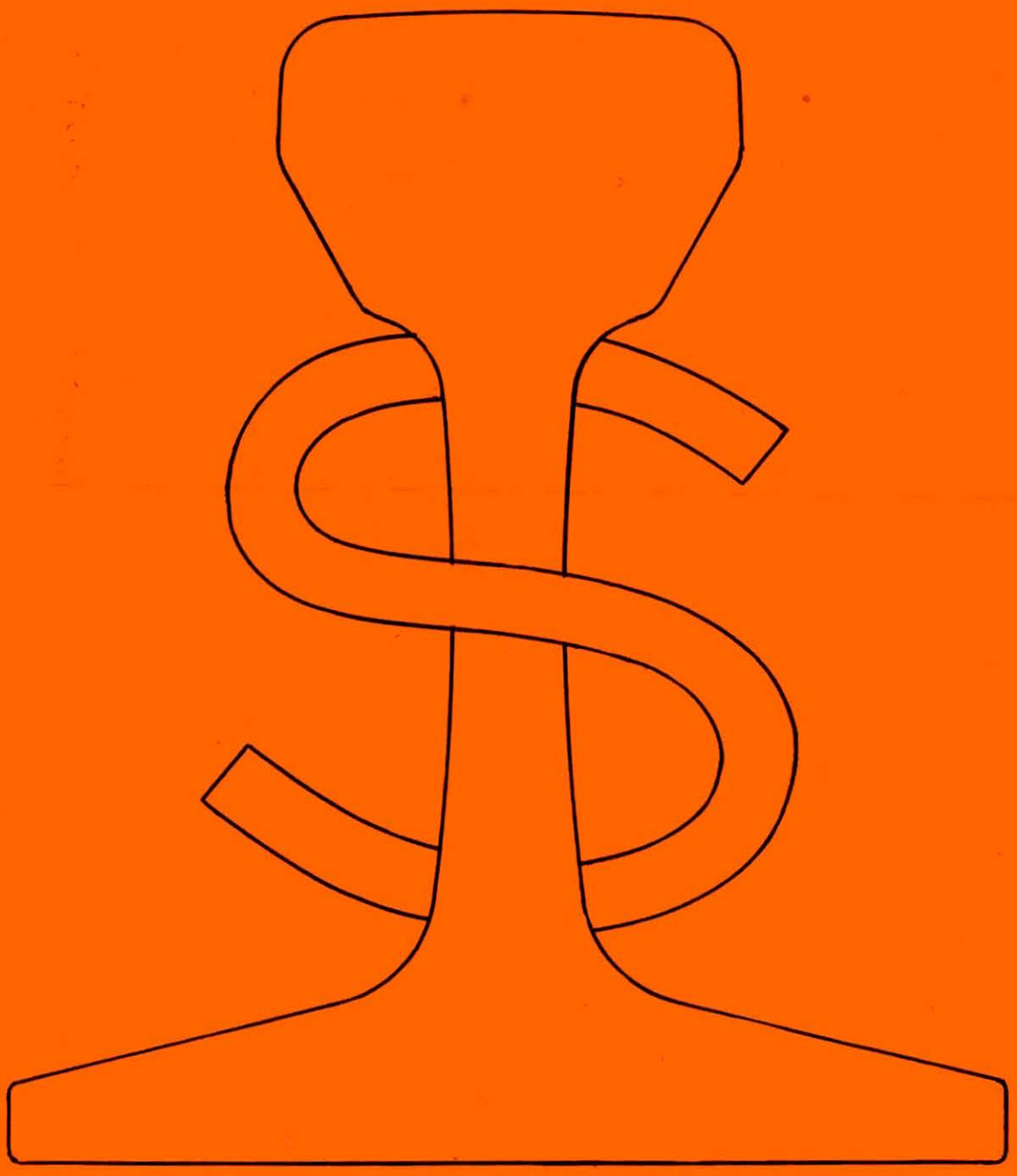
For further information and the service of G-E consulting engineers, address the nearest G-E office.

710-116

GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

THE THOMSON RAIL CORPORATION
OF NEW YORK
Pennsylvania Building —Philadelphia



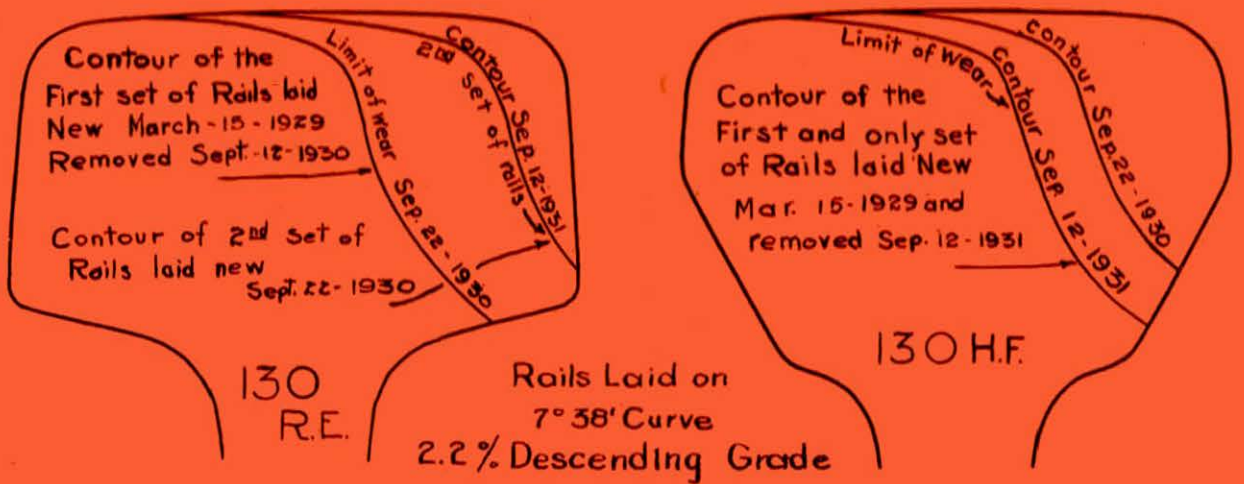
The Rail Stands for Headfree
The-S-Stands for-$-in Maintenance Economy
Headfree Rail Provides Greater Strength, More Area of Wear
And Less Train Resistance

Headfree Rail

versus

Standard Rail

Completed High Rail Test No-1-


Contour of the First set of Rails laid New March-15-1929 Removed Sept-12-1930
Limit of wear Sep. 22-1930
Contour Sep. 12-1931 2nd set of rails
Contour of 2nd set of Rails laid new Sept. 22-1930
130 R.E.
Limit of wear
Contour Sep. 22-1930
Contour Sep. 12-1931
Contour of the First and only set of Rails laid New Mar. 15-1929 and removed Sep. 12-1931
130 H.F.

Rails Laid on
7° 38' Curve
2.2% Descending Grade

— HISTORY —

We have given from time to time in the past two years data on a series of rail tests conducted on an Eastern Trunk Line Railroad. This data has been somewhat incomplete due to the fact that the standard R.E. section rail reached the limit of wear before the Headfree rail. It was therefore necessary to estimate the saving derived from the use of Headfree rail, until such time as the Headfree rail also reached the prescribed limit of wear.

In September 1931 the Headfree rails of Test No 1- reached this wear limit and we are now able to present actual data showing the time and tonnage life of the 130 R.E. and 130 Headfree rails and to also give the dollars and cents economy in the use of Headfree rail.

— A brief summary of this test is as follows —

On March 15-1929 the high side of a 7°38' curve was laid one half with Standard section Rail and one half with Headfree rail. On September 22-1930 after a tonnage life of 38680000 tons the Standard rails had reached the limit of wear and were removed. The Headfree rails not having reached the wear limit were allowed to remain in track, and a second set of new Standard rails were laid in the place of the first set removed, so as to obtain the full tonnage life of the Headfree rails in their original position. On September 12-1931 the Headfree rails reached the limit of wear and were removed from track. Life history as follows.

Standard rail - Calendar life - 557 days - Tonnage life - 38680000 tons
Headfree rail - Calendar life - 911 days - Tonnage life - 59587000 tons
Headfree Rail - 63% longer calendar life.
Headfree Rail - 54% longer tonnage life.

Headfree Rail

Progress & Economy

It will be noted on preceeding page that the Headfree rail has a 63% longer calendar life and a 54% greater tonnage life. As tonnage is the true index to rail life we will use the tonnage life as a basis for figuring the economies to be gained in the use of Headfree rail. In this test both the R.E. and the Headfree rail carried 38680000 tons of traffic in 557 days, which was the life of the first set of R.E. rails, and as the tonnage carried per day during the balance of the life of the Headfree rail was less than that carried during the first 557 days of its life, it is necessary to equate the entire calendar life (911 days) of the Headfree rail to a calendar life comparable with the tonnage life of the R.E. rail. The adjusted life is equal to 863 days, and on this basis the economy per ton of rail is calculated.

R.E. Rail costs $43.00 and Headfree Rail costs $44.00 per ton.

Cost per ton of rail per year of life.		
Item	R.E. Rail	Headfree Rail
Interest on one ton of rail at 6%	$00.258	00.264
Annuity to create $43 in 557 days at 6%	27.305	
Annuity to create $44 in 863 days at 6%		18.040
Annuity to create $4 for laying & picking up rail.	2.540	1.640
Less credit - Scrap rail recovered at $15 per ton	-9.525	- 6.150
Total cost per ton per year	$20.578	13.794
Saving per ton per year - $6.784 or 33%		

33%! There is no other single item of railroad track maintenance where so great a saving can be made.

ALL RAILROADS SHOULD MAKE THIS SAVING.

THE THOMSON RAIL CORPORATION
OF NEW YORK
Pennsylvania Building - Philadelphia

Patented in the United States and Canada. License to roll Headfree rail may be had by the Railroads from The Thomson Rail Corp.

LITERATURE ON PRIOR TESTS AVAILABLE UPON REQUEST

Headfree Rail

versus

Standard Rail

Test No. 1 7°38′ Curve

This is an unretouched photograph

PHOTOGRAPH taken at center of curve July 1, 1930 where compromise joint connects 130 lb Headfree Rails with 130 lb RE standard rails. This photograph clearly visualizes the manner in which wear takes place on Headfree Rail as compared to standard rail. Note: see back cover Railway Age issue Nov. 15, 1930.

Please recall that the earliest rail sections were more along the Headfree type. Designs were developed by the steel men from rolling, cooling and wearing standpoint. As steel, the metal, was developed the rails could be heightened to get higher Moment of Inertia. At the same time however lower corners were added to the rail head to give bearings for the top of the splice bars. It has since been called the T rail. This rail with its lower corners made it a bad section from rolling, cooling and wearing standpoints. While additional Moment was secured, we can as a result of many tests show, that the T rail troubles—which have been the subject of discussions for many years—were caused by its being a difficult section to roll, cool, and at the same time wear well. In regard to the wearing points brought out in this report the following is interesting. The Headfree Rail had a Moment 5.4% higher than the standard Rail when laid March 15, 1929, and six months later contours showed Headfree Rail had 7½% greater Moment; fifteen months later the Headfree Rail showed 9.2% greater Moment (photograph above); September 22, 1930 when standard Rail was removed Headfree Rail had Moment 10.77% greater. The Headfree Rail which was removed Sept. 12, 1931 had carried a little more than 20,000,000 additional tons.

The Thomson Rail Corporation
of New York

Pennsylvania Building—Philadelphia

Additional copies of this test obtainable upon request.

Paid, USA and Canada

Merely Keeping Busy Is Not Good Business

THE reclamation of springs in railroad shops may keep a few men busy but it costs much more than sending broken springs to us for repair. This keeping busy is often bad business.

Few railroads have sufficient volume in tonnage to justify the purchase of the equipment needed to rework and heat treat old springs and make them equal to new. Few shops can keep workmen so busy on springs that they become really expert. Only a big spring organization can perform research work and advance with the art of spring making.

The repair of broken springs should receive the same skillful attention as the manufacture of new ones. Much of the misalignment of locomotive equalizing mechanisms is due to poor and non-uniform springs. Without adequate equipment, skilled labor, a volume in tonnage and a complete, well-rounded organization it is impossible to repair springs properly and economically.

Send Your Springs To Us For Repairs

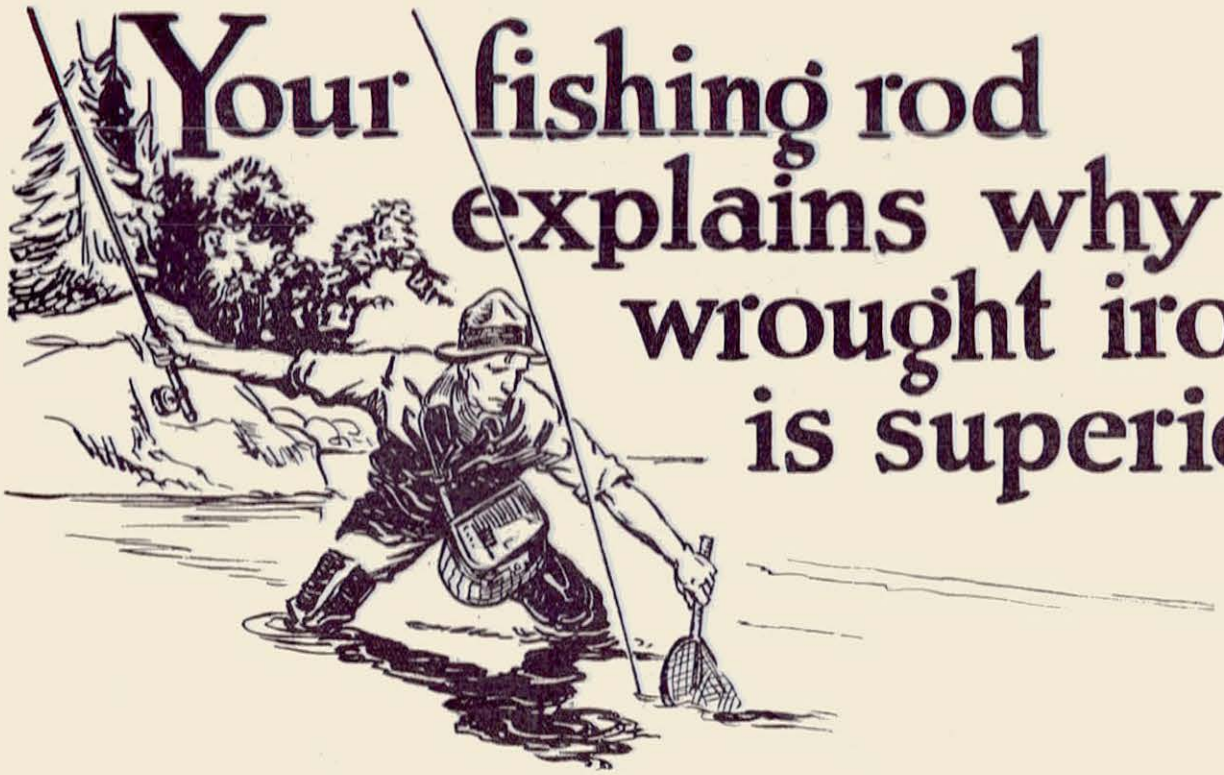
Railway Steel-Spring Company

30 CHURCH ST., NEW YORK

Branch Offices:

Chicago, Ill.	Detroit, Mich.	St. Louis, Mo.	Pittsburgh, Pa.	Montreal, Que.
St. Paul, Minn.	Washington, D. C.	Cleveland, Ohio	Denver, Colo.	San Francisco, Cal.

Your fishing rod explains why wrought iron is superior



FABRICATION of the split bamboo fishing rod clearly demonstrates the superiority of a built-up structure to render superior service.

THE secret of the success of wrought iron in being able to hold its own and to keep up its reputation as *the* most reliable material is due to a very simple fact; namely, that it is the only metal which has a fabricated or built-up structure. The multi-many-ply structure of wrought iron readily distinguishes it from steel or alloys.

Wrought iron is the only commercial metal material which is not obtained through melting and casting, but by welding together separate small pieces into a single large piece. Welding together of component parts followed by forging and rolling does not eradicate the identity and outline of each original component piece, but produces their close jointing into a well defined fabricated structure.

Wrought iron excels by its ability to resist or retard fracture under vibrations and shocks and likewise by its ability to resist or retard corrosion. The more it is recognized that a fabricated built-up structure is a reliable material, that it will resist progressive growth of unavoidable incipient surface cracks, caused by tool marks or corrosion or other surface imperfections, the more the consumer will be benefited by a judicious selection of the right kind and quality of wrought iron for diversified special requirements, not only of locomotive parts but of passenger, freight car and track equipment. This selection can be made from different distinctive typical grades.

Among the Vulcan Iron Specialties are:

VULCAN BLOOM STAYBOLT IRON

VULCAN IRON FORGING BILLETS

VULCAN XX ENGINE BOLT IRON

A Vulcan Iron product for every railroad purpose.

LOCKHART IRON & STEEL CO. PITTSBURGH, PA. VULCAN

LOCKHART IRON & STEEL CO.

Pittsburgh, Pa.

DIRECT MILL REPRESENTATIVES
BLATCHFORD CORPORATION
RAILWAY EXCHANGE,
CHICAGO, ILL.

Universal

ONE-HAND BRAKE

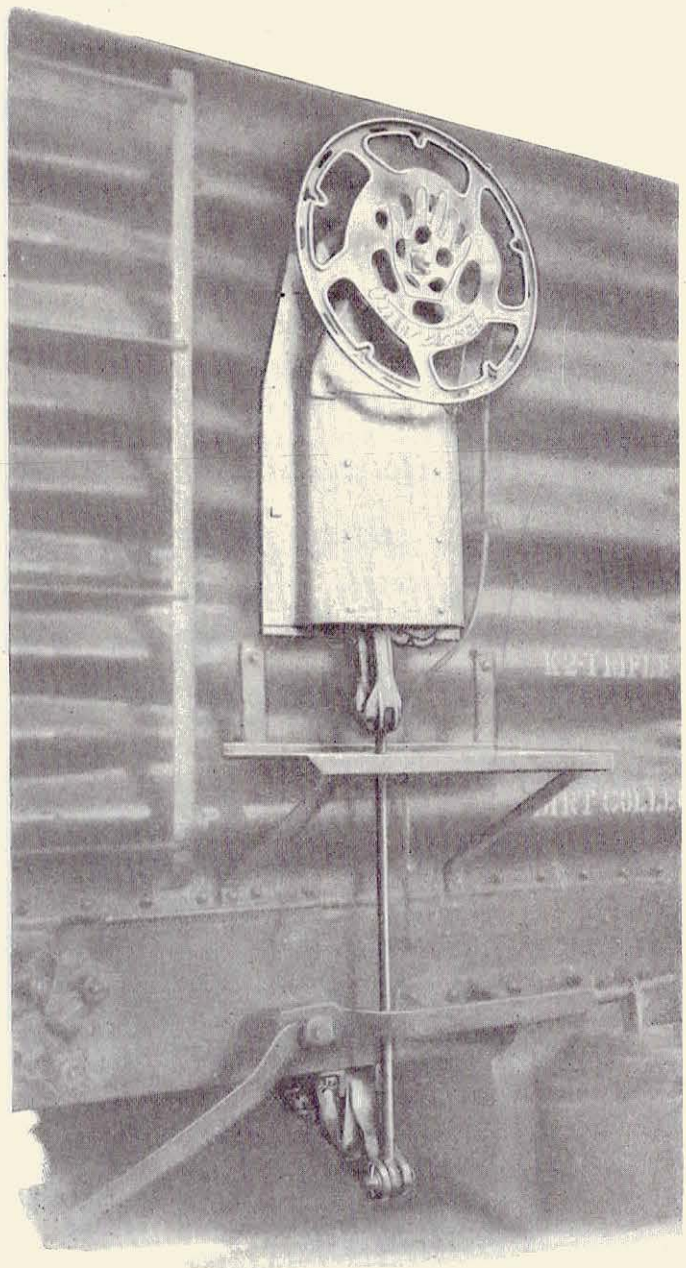
Perfect control of car with ONE HAND, leaving the other hand and both feet free to maintain a SAFE position.

AMPLE POWER without use of gears or other complicated mechanism.

UNIT construction. Easily and economically applied to car without change to Brake Rigging.

Principle Correct—Proven by years of satisfactory service on many thousands of cars.

Past performance shows maintenance cost to be practically negligible.



Universal Draft Gear Attachment Co.

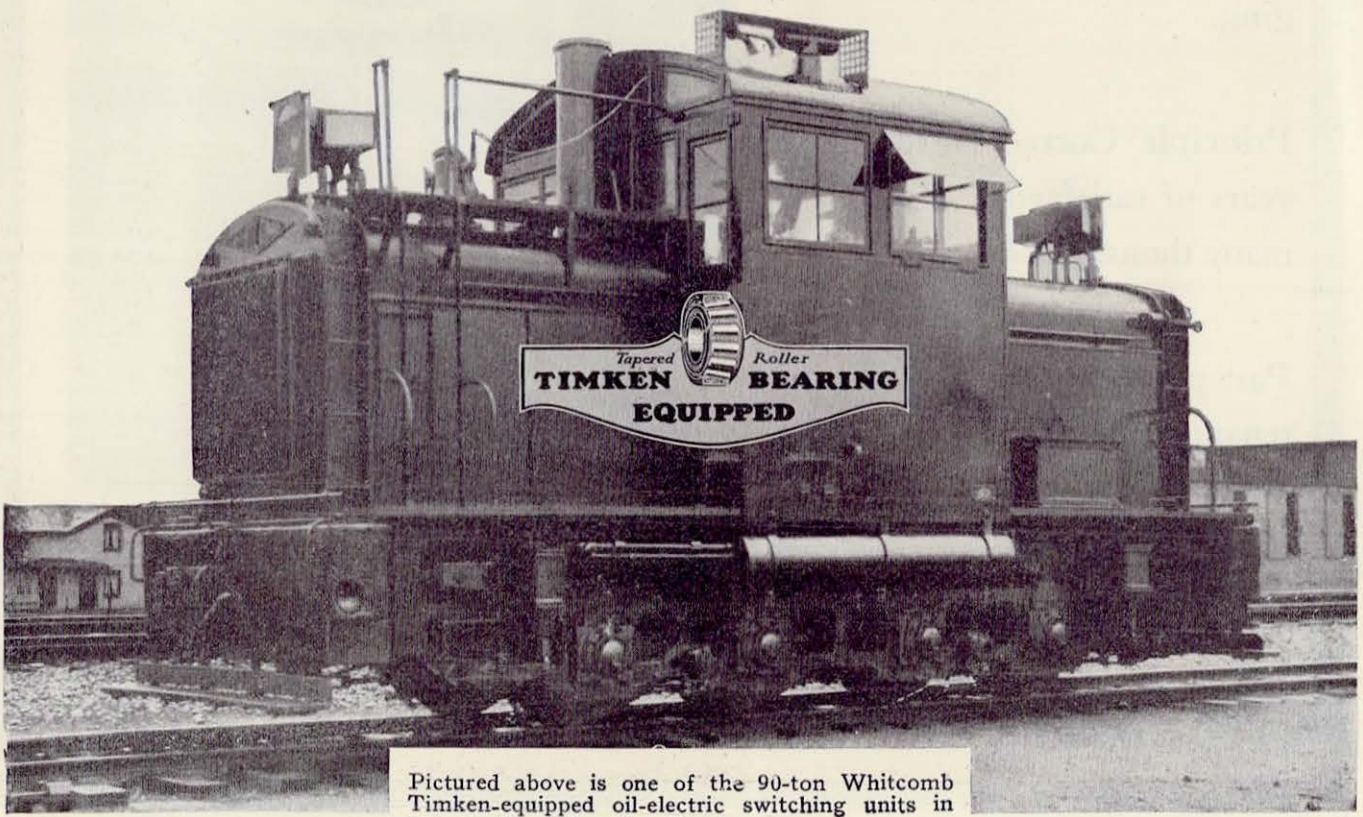
332 South Michigan Ave., Chicago

Royal Bank Building, Montreal, Canada

All large WHITCOMB oil and oil-electric locomotives, manufactured by The Whitcomb Locomotive Co., Rochelle, Ill., are standardized on Timken Bearing Equipped axles

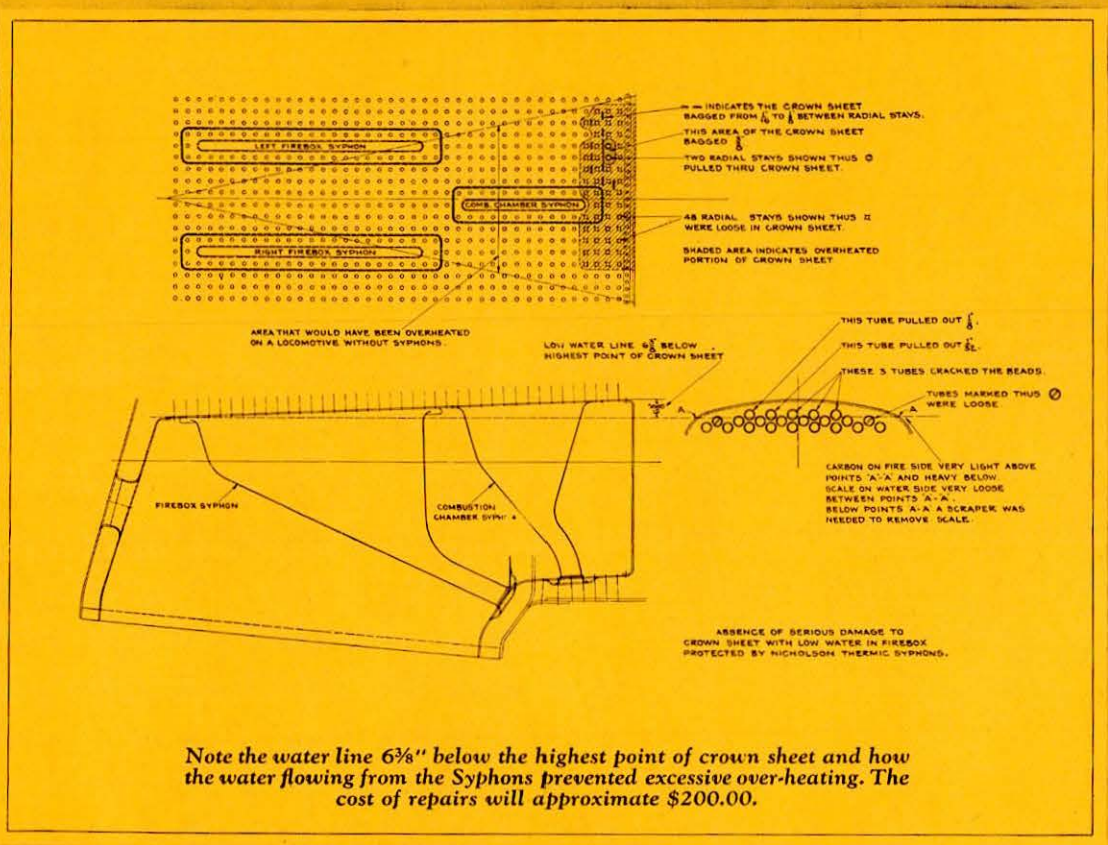
Dependability, economical operation and cut-to-the-bone maintenance are inseparably associated with Timken tapered construction, Timken positively aligned rolls and Timken-made steel in all types of rolling stock. Specify Timkens. The Timken Roller Bearing Company, Canton, Ohio.

TIMKEN
Tapered
ROLLER BEARINGS



Pictured above is one of the 90-ton Whitcomb Timken-equipped oil-electric switching units in use on the Milwaukee Road.

For the Third Time—
The Combustion Chamber
SYPHON
Has Proven Its Value as a
SAFETY DEVICE


— — INDICATES THE CROWN SHEET BAGGED FROM 1/16 TO 1/8 BETWEEN RADIAL STAYS.
THIS AREA OF THE CROWN SHEET BAGGED 1/8
TWO RADIAL STAYS SHOWN THUS ⊙ PULLED THRU CROWN SHEET.
48 RADIAL STAYS SHOWN THUS ⁞⁞ WERE LOOSE IN CROWN SHEET.
SHADED AREA INDICATES OVERHEATED PORTION OF CROWN SHEET
LEFT FIREBOX SYPHON
COMB. CHAMBER SYPHON
RIGHT FIREBOX SYPHON
AREA THAT WOULD HAVE BEEN OVERHEATED ON A LOCOMOTIVE WITHOUT SYPHONS.
LOW WATER LINE 6 3/8 BELOW HIGHEST POINT OF CROWN SHEET
THIS TUBE PULLED OUT 1/8.
THIS TUBE PULLED OUT 1/16.
THESE 5 TUBES CRACKED THE BEADS.
TUBES MARKED THUS ⊘ WERE LOOSE
CARBON ON FIRE SIDE VERY LIGHT ABOVE POINTS 'A'-'A' AND HEAVY BELOW. SCALE ON WATER SIDE VERY LOOSE BETWEEN POINTS A-A. BELOW POINTS A-A A SCRAPER WAS NEEDED TO REMOVE SCALE.
FIREBOX SYPHON
COMBUSTION CHAMBER SYPHON
ABSENCE OF SERIOUS DAMAGE TO CROWN SHEET WITH LOW WATER IN FIREBOX PROTECTED BY NICHOLSON THERMIC SYPHONS.

Note the water line 6⅜" below the highest point of crown sheet and how the water flowing from the Syphons prevented excessive over-heating. The cost of repairs will approximate $200.00.

The crown sheet of a Syphon-equipped locomotive carrying 240 pounds steam pressure after recently passing a severe low water test.

This is the twenty-fifth case of low water on locomotives equipped with Syphons of which we have been advised. Water levels have been as low as 16" below the tops of the crown sheets. Syphons ALWAYS prevent serious damage.

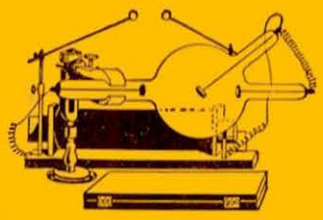
LOCOMOTIVE FIREBOX COMPANY

NEW YORK CHICAGO MONTREAL

Dearborn
TRADE MARK REGISTERED

Scale

—Complete and Economical Prevention Maintained by Dearborn Scientific Methods



The X-ray was accidentally discovered by Prof. Röntgen on October 8, 1895. Four days later through its use a bullet was located in a patient's leg. The Dearborn Laboratories had then been operating for eight years, overcoming by analysis and research, the troublesome tendencies developed by boiler waters. Through the years this specialized service has been brought to its present high degree of efficiency.

Variations in quantity and kind of scale forming salts, and in operating conditions, necessitate an individual diagnosis of each railroad's water problems. Analysis of the water supplies is made in the Dearborn Laboratories and the Dearborn Treatment supplied contains the necessary materials to overcome the scaling condition.

Only through laboratory analysis is this simple, direct procedure possible. Only through years of research and experience have the most suitable combinations of treating materials been demonstrated. Dearborn Water Treating Methods have been proven in service to railroads the world over. Their economies, effectiveness and simplicity are outstanding.

In most cases, when we are called upon to correct a scale forming condition, the locomotive boilers already contain scale deposits. The Dearborn Treatment supplied not only stops the formation of new scale, but also disintegrates the scale already present, bringing it down gradually while the boilers remain in service.

Scale prevention is a constant responsibility which should be systematized as carefully and developed as economically as any other operating feature.

For this work the Dearborn Chemical Company offers you the facilities and services which are the standard of the world in effectiveness and economy.

Discuss this service with the Dearborn representative who calls on you, or write us sending gallon samples of your water supplies for analysis and recommendation (made without charge). Address us at 310 South Michigan Avenue, Chicago or 205 East 42nd Street, New York or 2454-64 Dundas Street, West, Toronto.

DEARBORN CHEMICAL COMPANY

GUARD AGAINST CORROSION

Wrought Iron Protection-Plates ward off Destruction from Car-Drippings

EVERY week brings a greater demand from railroads for Byers Genuine Wrought Iron protection plates, blast plates and bearing plates. In places where you cannot paint—where drippings from refrigerator cars cause high-speed corrosion—where the hot, sulphurous fumes of smoke strike metal—bridge engineers are specifying Genuine Wrought Iron Plates. They are guarding themselves against unnecessary deterioration and replacement. They know that there is no satisfactory, economical equal for wrought iron, when it comes to combating corrosion and vibration-fatigue.

Probably no single industry has greater need of wrought iron than the Railroad Industry. Certainly no industry has recognized wrought iron's merits more quickly or more continuously. Byers wrought iron pipe for bridge railings—Byers protection, blast and bearing plates—have become practically "standard equipment" in many of the leading railway-engineering departments of America. And now, with the recent introduction of a remarkable Byers Bending Pipe, wrought iron has proved its ability once again to aid railroads in their constant battle for economy.

Incidentally, while Byers has been the standard of wrought iron quality since 1864, Byers is today producing a better quality of wrought iron than ever before in the Company's history. Write for Pipe Bending Bulletin No. 50. A. M. Byers Company, Pittsburgh, Pa. Established 1864.

BYERS GENUINE WROUGHT IRON PRODUCTS

PIPE	WELDING ELBOWS
TUBING	SPECIAL BENDING PIPE
CASING	PLATES & SHEETS
NIPPLES	BAR IRON
COUPLINGS	BILLETS

AN INVESTMENT NOT AN OUTLAY

What the automobile can teach the railroad

THERE isn't a president of a successful automobile company in the United States that doesn't devote a big share of his thinking to business promotion.

These chief executives know that alert, vigorous selling is the life blood of their business. That's why there are so many automobiles in use—and incidentally, and most important to you, it's why so much public travel today is by motor car and why so much shipping is by motor truck.

With business what it is right now, isn't it opportune for the men in real authority in the railroads to give constructive leadership to their freight, passenger and advertising departments?

The Chicago Tribune thinks so—and accordingly has developed a plan for railroad business promotion that deserves consideration by the biggest men in every railroad's management.

This plan is based upon the Chicago Tribune's experience as a large shipper and large user of passenger service—and upon its concrete knowledge of the sales opportunities available in the Chicago market.

It is a plan that details how any aggressive railroad can develop business in a substantial way in a territory of 12,200,000 population served by the Chicago Tribune. It will be presented to any interested railroad executive by an informed Chicago Tribune representative.

In the interest of your earnings and your stockholders, why not invite a Tribune man to call and see you?

Chicago Tribune

THE WORLD'S GREATEST NEWSPAPER

FURTHER ECONOMIES *ARE* POSSIBLE

RAILROADS have shown such steady progress in cutting down operating expenses that, to many, it may seem as if no further economies could possibly be made.

And yet, some railroads have gone further than others by purchasing and installing recently developed specialized machines that save time, labor and money in railroad accounting. Their monthly charges to operating expenses have thereby been greatly reduced.

For example, here are a few of the new Burroughs machines especially designed to effect substantial economies in railroad accounting:

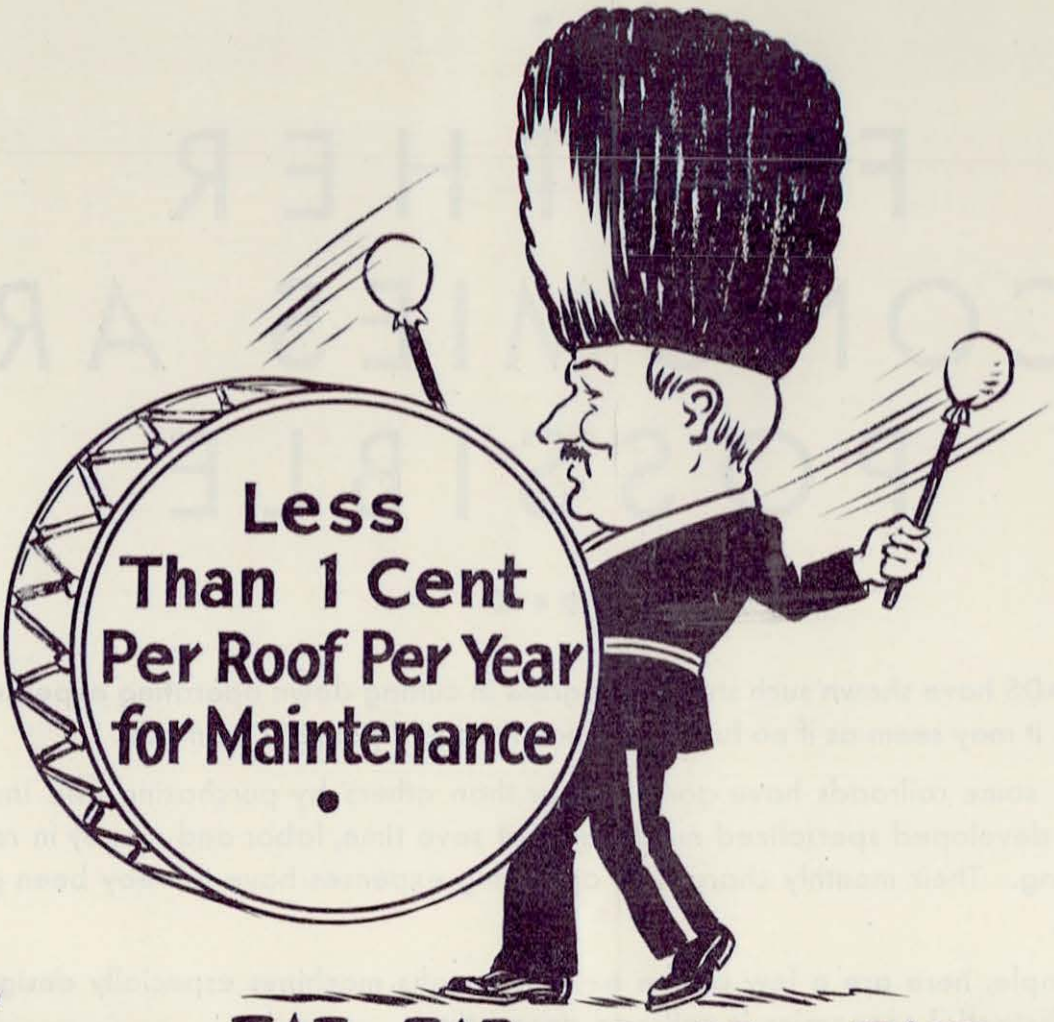
- The new Burroughs for preparing agents' abstracts and station register in one operation.
- The new Burroughs for writing abstracts and division sheets of interline waybills.
- The new Burroughs for tabulating and statistical work in compiling freight statistics and auditing agents' accounts.
- The new Burroughs for establishing interline road control figures.
- The new Burroughs Electric Calculator for extending, checking, statistics and all other railroad calculating.
- Also improvements in other Burroughs machines for all routine adding, bookkeeping and billing jobs.

The economies which these new machines provide are largely the result of the adaptability of the machine to the job for which it was especially designed . . . greater speed and ease of operation . . . greater accuracy . . . exceptional sturdiness of construction . . . low purchase price and low cost of upkeep.

Investigate. The experience of the Burroughs Railroad Accounting Division is at your service. You may telephone the nearest Burroughs office, or you may write direct.

BURROUGHS ADDING MACHINE COMPANY · *Railroad Accounting Division* · DETROIT, MICH.

Burroughs



Sure-We Want the Whole Railroad World to Hear This!

A message of proven economy! Facts obtained from actual service records.

Here they are. The cost of roof maintenance from 1913 to 1930 inclusive on 30,000 Canadian National Cars equipped with Dry Lading Roofs, amounted to $4519.49. The average cost per year for the entire 30,000 roofs amounted to $250.00. About 15 cents per roof for the 18 year period. Less than one cent per roof per year. Think of it. There's a real accomplishment with big worthwhile savings.

And now we offer the UNIVERSAL Dry Lading Roof—a vast improvement over the Dry Lading Roof.

It is a combination riveted and flexible roof.
It has all the advantages of a riveted construction, plus flexibility for adjustability.
It consists of only nine one-size and one-design parts.
These parts fit any width, length or design of house car.
It assures weather-proof roof service.
The spelter coated steel resists rusts and eliminates the expense of periodic painting.

Do you wonder why we say, the UNIVERSAL Dry Lading Roof is the greatest economical improvement in car construction.

Hutchins Car Roofing Company

RAILWAY AGE

Railroad Freedom or Government Ownership?

The breakdown of government regulation in the crisis of the war forced the railways into government operation, but government operation soon destroyed the sentiment for government ownership. The breakdown of regulation in 1931 will have bad immediate effects, but it may help to solve the railroad problem by making clear to many persons what has been and is wrong with our government policies affecting the railways. As the *Railway Age* said last week, the decision of the Interstate Commerce Commission in the 15 per cent rate advance case could be criticized too severely. The government policies that forced railway executives to seek an advance in rates at such a time, and the plan of "relief" offered by the commission, could not be criticized too severely.

Few railway officers or shippers will say frankly to the commission or the public just what they think about what the commission says or does because of fear that to do so will prejudice their interests in cases before it. The present condition of the railroads, however, demands honest and courageous discussion of the real reasons for it. The railways have been adversely affected, like other industries, by the depression. They are in a more dangerous condition than other major industries, however, owing to causes other than the depression. The depression will pass, but the railways finally will be driven into government ownership unless the other causes of their present condition are attacked and eliminated.

Administration Interference With Wages

The interference of the federal administration with wages is one of the principal causes of the present railway situation. The Railway Labor act outlines the process which should be followed in advancing or reducing railway wages. During prosperity wages were advanced under this law until in 1930 the average hourly wage was the highest in history. If it was a good law during prosperity, it was a good law during depression, but repeated declarations of spokesmen of the administration against reductions of wages have made it practically inoperative during the last two years. This experience has demonstrated the inexpediency of extra-legal government interference with wages, and it never should be tolerated again.

In its opinion in the 15 per cent rate case the Interstate Commerce Commission made various constructive suggestions for the future solution of the railroad problem. Some of these relate to legislation that should be passed by the national and state governments to free the railways from the unfair competition of subsidized and unregulated carriers on highways and waterways. Some of them relate to means by which the railways could increase their net revenues by better co-operation between themselves. With the policies suggested the *Railway Age* is in entire accord, and it has, in fact, advocated them for years.

Regulation by Commission

The opinion does not, however, discuss the most important of all pending questions affecting the future of the railways. This is, as to whether regulation by the commission itself can ever be made a success. Regulation by the commission has been a failure for 25 years. Under it the railways never have earned as large a return upon their investment as in the period before it was adopted. Under it their return has been less in every period of prosperity than in preceding periods of prosperity, and less in every depression than in any preceding depression. The commission's regulation is the principal reason why the railways are in so much worse condition now than most other major industries. No future policy can enable private management of railways permanently to succeed that does not take this fact as its major premise.

It is significant that the members of the commission were virtually unanimous in their decision in the rate case. It is also significant that there has been virtual uniformity in the commission's policy throughout the last quarter century, in spite of its constantly changing personnel and of changes in the laws entrusted to its administration. The Transportation act was adopted to so change its policy as to stop the decline in railroad net return, but it did not change the com-

mission's policy. One thing it has always been possible to predict with astronomical certainty, and this is that, regardless of business conditions, legal provisions and court decisions, the commission would find some excuse, subterfuge or fallacy for failing to allow the railways to earn a "fair return." Never once in twenty-five years has it failed in this respect. It advocated legislation providing for a valuation based largely upon cost of reproduction, but when conditions so changed that such a valuation would increase the basis upon which the railways would be legally entitled to a return it promptly reversed itself and repudiated cost of reproduction as a factor in valuation. It has held in two or three cases that low commodity prices were a justification for reducing, or not advancing, rates, but never has it been able to find that high commodity prices were a justification for maintaining or advancing rates. In every important case involving advances in rates, from the 1910 case to the 1931 case, it has lectured railway managements for shortcomings most of which are unavoidable in the conduct of a competitive business, and used these imperfections as a reason for refusing to allow them to make adequate earnings, although the laws that the commission itself administers require competition.

Influences Affecting Commission's Policy

There is plainly something fundamentally wrong with our system of regulation by commission, and this was never so evident as now. Theoretically, the trouble is not with the laws that the commission administers. If the commission had done what the Transportation act told it to, the railways would have prospered throughout the last ten years, and would not be in their present condition. Many, however, are reaching the conclusion that the fundamental trouble is that present laws give the commission a power which no body constituted and influenced as it is can ever be expected to so exercise as to enable the railroad problem to be solved under private ownership. Experience strongly supports this view. The commission has much more power than all the officers of the railways combined to determine total railway earnings, and is also authorized to determine the net return that may be earned. This is practically the power of life or death over private ownership of railways. Why does the commission constantly exercise its power as if its objective were the destruction of private ownership although most of its members profess to be opposed to government ownership?

First must be considered the commission's personnel. Its members always have been men of more than average ability; but few of them have been appointed because of their special knowledge of railroad management, operation or rate-making. Radicals oppose the appointment of such men, railway executives and conservative business interests do not demand it, and it is doubtful if the Senate would confirm them. There seems little hope, therefore, of the appointment of more men who understand the problems to be met.

After his appointment a commissioner has little opportunity to acquire practical knowledge of railroad management, operation or rate-making. The commissioners could have learned more in a few minutes in the meetings of the railway executives as to why the executives agreed to seek a 15 per cent advance in rates than they learned in all the formal hearings. Business is one thing, and government regulation something else. Regulating authorities may deal with theories, but business men must deal with realities. A case before the commission is, in effect, a law suit. The most successful business lawyers keep their clients out of court as much as possible because a court is a poor place to give the information and do the compromising necessary to the expeditious and rational solution of business problems. Regulation by commission is proving to have all the disadvantages of court proceedings as a means of solving business problems, without the most important advantage usually inherent in court proceedings—that of getting decisions that strictly interpret and carry out the laws. The commission, sitting as a judicial tribunal, and made to feel omniscient and sacrosanct by the self-serving genuflections of litigants and their lawyers, never has a chance to understand and evaluate the human nature necessarily involved in the railroad problem.

The commission, by its very nature and its location in Washington, where politics is the only industry, is subject to constant political pressure. Its members know that radical members of the Senate always are ready to attack them for any vote they may cast for a decision helpful to the railroads. On the other hand, the exigencies of politics prevent conservative public men from attacking any commissioner for voting for a decision unfavorable to the railways. The commission is never free from this political pressure adverse to the railroads; and to say that it is not influenced by it is to disregard human nature and the entire history of regulation by commission.

The commission has adopted a theory of regulation which is now strongly intrenched because of its past decisions, but under which no private business could permanently be successfully managed. This theory, which was expounded again in its opinion in the 15 per cent rate case, is that the railways are not entitled to the constitutional protection afforded all property by decisions of the Supreme court, but that the commission's judgment alone should determine the amount of net operating income they should be allowed to earn. Apparently the commission, if allowed to retain its present power, will continue to act on this principle, regardless of all court decisions and economic consequences.

Why Not Railroad Freedom?

These and other considerations raise very forcibly the question as to whether the commission has not more power than it can ever be expected to so exercise as to make possible the successful conduct of the

railroads under private ownership. Nobody questions the desirability of retaining the laws prohibiting unfair discriminations and empowering the commission to correct them. But should it be allowed to retain the powers of suspending advances in rates and determining railway profits?

The public, the shippers and the railways have become so accustomed to the present system of regulation that any suggestion that the commission should be deprived of a large part of its power is likely to be regarded by many persons as an attack upon the very ark of the covenant. But why should not railroad executives be allowed to manage the railroad business? Why should not railway officers be given the same freedom to advance rates and wages in periods of prosperity and reduce them in periods of depression that is exercised by the managements of other business concerns? The commission's opinion in the 15 per cent rate case gives a conclusive demonstration that the transportation industry is now one of the most highly competitive industries in the country. Why allow competition to regulate in other industries, and not in the highly competitive transportation industry? Why, especially, allow competition to regulate the service, rates and earnings of the subsidized carriers by highway and waterway that compete with the railways, and continue to regulate the railways as if they were engaged in a non-competitive business?

There are three possible solutions of the railroad problem—railroad freedom, government regulation, and government ownership. Under the first mentioned policy there were abuses, but under it the railroads were built up into a great industry. Under the second policy, which has been tried for 25 years, many forms of railroad initiative, according to claims of the commission and spokesmen of some business interests, have been largely destroyed, and the returns earned by the railways have steadily declined until their condition in every depression becomes a menace to the entire nation and is now the most serious ever known. Nobody wants government ownership; but a continuance of the present policy of regulation will make it inevitable. Probably the best solution of the nation's transportation problem would be for government to withdraw all subsidies from every means of transportation, prohibit unfair discrimination by any of them, and withdraw all other regulation from the railways.

It will be said by some that this would create chaos in transportation. There is chaos now, after 25 years of effective federal regulation by commission, and government policies, not railway management, have created it. If government regulation cannot do any better than it has in the past—if it must year after year practice unconstitutional confiscation of railroad property, make it impossible for the railroads to meet the competition of other means of transportation, and reduce them to virtual insolvency in every depression, then certainly railroad freedom could not cause worse results than railroad regulation.

Take the Depreciation Order into the Courts

The reason, or excuse, for stringent regulation of the railways has been the "monopoly" of transportation which they enjoyed. Actually, their "monopoly" never was complete. There has always been competition among railways between important points, and water transport has ever been a competitor. The railroad position has never been the same as that of the public utilities—gas, water, electric, telephone and street railway companies. Now with the growth of other forms of transport the railways are not monopolies at all—or at most only in a very limited sense.

Is railway regulation, by reason of the rapidly diminishing reason for its existence, growing any the less stringent? The answer to this question is so obvious that the asking implies the reply. The tentacles of regulation multiply in number and grow in strength with each passing year, restricting more and more the field of management. The commission's recent order requiring uniform accounting for depreciation is the latest important step in this direction.

True accounting deals with realities, using money for counters—money received for services rendered, money paid out for operating expenses and taxes, money distributed as interest and dividends. What has depreciation of physical plant got to do with money?—Simply the fact that a piece of equipment eventually wears out and has to be replaced and at that time, and that time only, is there a money transaction. The fact of depreciation is not an accounting matter at all. Guesses, estimates and opinions—are such things to be accorded official sanction in the books? What is this so-called depreciation accounting but a process of taking out of the hands of management one of its few remaining prerogatives and making charges for replacement purposes a set figure falling alike in lean years and those of plenty?

With the increasing exercise of power by regulatory authorities has there been an accompanying increase in an attitude of concern for railway welfare on the part of the authorities? The denial of the rate increase shows how little responsibility for railway credit the commission assumes to compensate for its malignant interference with the functioning of railway management. If the railways were forced to make normal depreciation and retirement charges in a year such as the present, how many of them would escape showing a deficit after fixed charges?

The Supreme Court has, fortunately, in several decisions set itself on record on depreciation charges following a method which appears to be widely at variance with the one laid down by the commission in this case. That being so, the courts should be asked to rule upon this order, and all such efforts to entangle railways further in a net of expensive and unwarranted regulation should be combatted by every legal means.

Rail Motor Cars for Economy

Necessary train service on light-traffic lines can be provided by motorized units at half the cost of steam trains

THE cost of providing necessary railway passenger service on many light-traffic lines can be reduced by as much as 50 per cent through the substitution of modern, efficient rail motor cars for steam passenger trains. In every item of operating expense, particularly wages, fuel and maintenance, the cost of rail motor car operation is substantially less than the cost of continuing steam train service. This fact is of vital importance to the railways at a time when local passenger traffic has declined to its present low level.

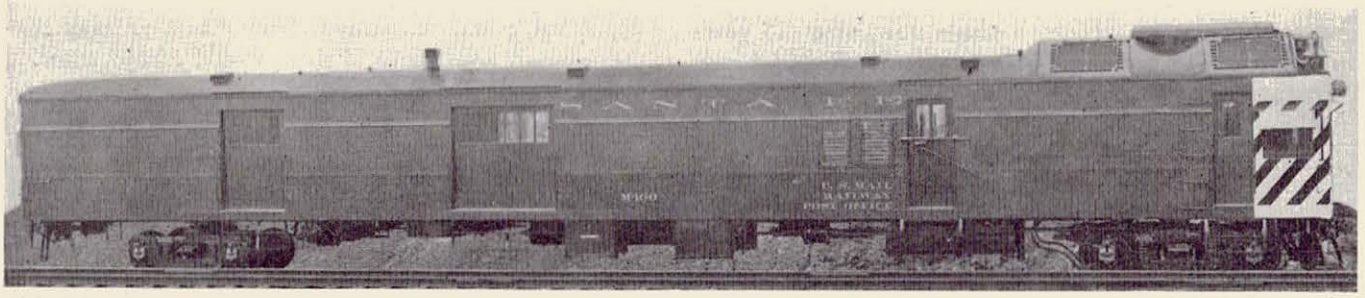
As public service institutions, it is one of the obligations of the railways to provide passenger service adequate to meet the needs and convenience of their patrons. As business institutions, it is the obligation of the railways to maintain necessary service at a profit, if possible, but, in any event, at no loss greater than that which cannot possibly be avoided. With a large proportion of their short-haul passenger business lost—and probably permanently lost—to the highways, the railways are facing the necessity of so adjusting the expense of the passenger-train service which must be continued, however light the traffic may be, that the losses incurred will be held to the absolute minimum. The cost of steam train operation is not subject to much reduction; moreover, it is fixed by conditions beyond the control of railway management. If the traffic handled by a train is insufficient, therefore, to cover the expenses of train operation, the only way to eliminate or reduce the loss sustained is to provide some form of carrier which can be operated at a lower cost in substitution for the train.

Railways in many parts of the country are finding the rail motor car to be an efficient and economical substitute for the steam passenger train on those lines where the traffic available is inadequate to cover the expenses of train operation. Substantial economies are being obtained by railways through the operation of rail motor cars on branch lines and on light-traffic main line schedules. Their flexibility and adaptability, indicated by the wide variety of uses to which equipment of this type is being put by different railways and the economy which is resulting from their operation, leave little room for doubt that the rail motor car offers one of the most outstanding opportunities for the rendering of adequate passenger service on lines where the available revenue is limited.

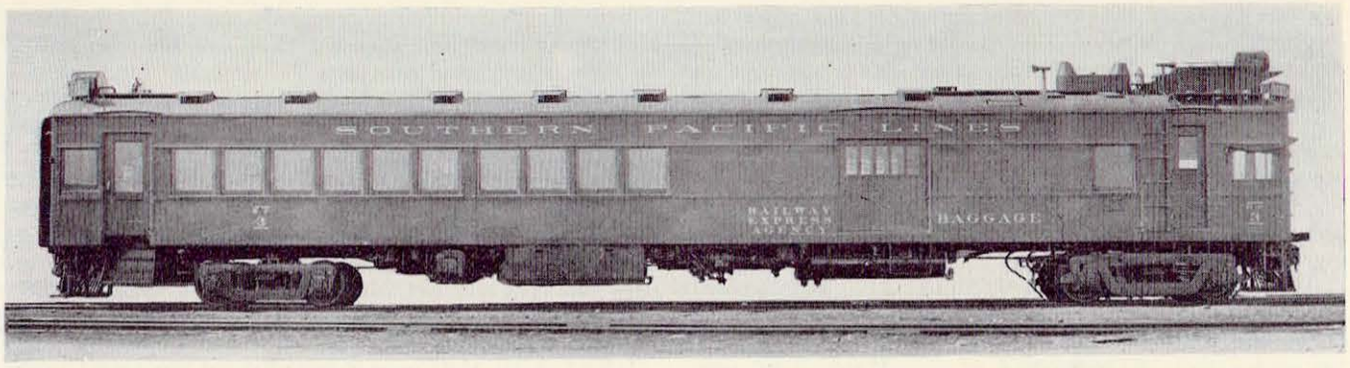
Proved Ability

The rail motor car, as a transportation unit of high availability and capable of rendering efficient service at low cost, is not new and untried. It has proved its ability to perform the tasks put before it on a number of railways. Concerning the rail motor car, a committee of the Motor Transport Division, American Railway Association, has reported as follows:

The experience gained during the last few years has dem-



An 80-ft. Gas-Electric Car Equipped with a Brill 535-hp. Single-Unit Power Plant



A 75-ft. 400-hp. Rail Car Equipped with an Electro-Motive Single Unit Power Plant

onstrated the economic value of the rail motor car for certain classes of rail service when compared to other forms of transport. Its chief value lies in its ability, in many instances, to perform a given service at a relatively lower cost than the same service can be performed by a steam locomotive. The chief secondary value is its cleanliness. Considering the cost of the rail motor car and its suitability and capacity for high mileage or long hours in service, it can be used, as a rule, most advantageously in such service. The economies are effected principally by the use of low-cost fuel, crew reduction, high availability and elimination of facilities necessary for servicing locomotives.

It appears to be the consensus that to date the following classes of rail motor equipment have proven their worth when used in the service for which they are adapted: The small bus or light body type, with mechanical transmission, not exceeding approximately 150 hp. capacity, for very light traffic, operating as single units; the larger and heavier types, with electrical transmission, ranging in capacity from 150 hp. to 400 hp. in single engine units, and up to 800 hp. in double or dual units. Within the last three years, the improvement in the mechanical design of the prime mover and the transmission has been most marked and if this rate of improvement continues, which may well be expected, it is safe to predict that we will have more powerful and more efficient units available for service and probably at a lower cost per horsepower, depending somewhat on the demand.

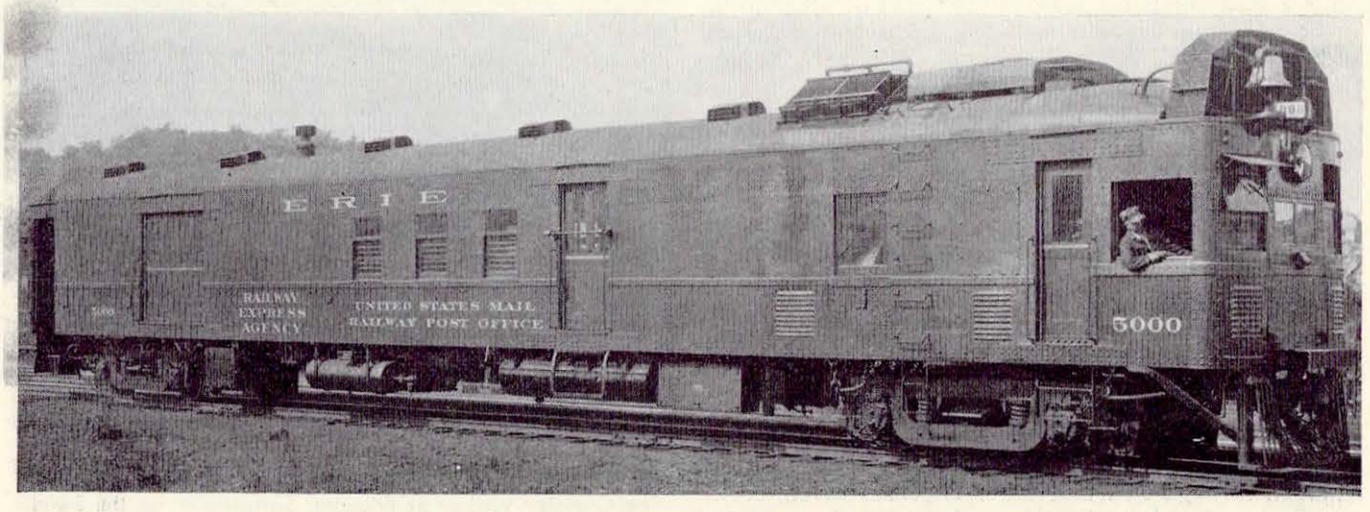
Rail motor cars are now in service with single-unit power plants up to 535 hp. capacity.

When the rail motor car was still in the experimental stage, it was believed that its principal utility would be in supplanting steam service on relatively short branch lines. There is, of course, a definite use for rail motor cars in this class of service, but their utilization has gone far beyond this modest beginning. Rail motor cars are now being used in an increasing variety of ways and they are no longer confined to service on branch lines. One railway uses a car to handle local passenger traffic on a daily run of more than 300 miles on its main line, thus supplanting steam trains with a more flexible service and also relieving the long-distance trains of numerous stops. There are many combination main and branch line cars serving local traffic on the main line, making a round trip or two over one or more branch lines in the vicinity, and returning to the tie-up point on the main line. Other cars are used in main-line commuter service during the rush hours and also for making branch line trips during non-rush hours.

Variety of Uses

It is no longer a requirement that the cars return to their tie-up point every night. One railway operates a pool of three cars which cover a considerable section of the railway, making various trips and returning to the original tie-up point every third day. Two or three of the short lines are even using the cars in mixed train service, picking up local freight cars in light traffic districts. A significant development also is the successful operation of de luxe motor-car trains by several railways. Railways operating motor-coach lines have found the rail motor cars to be invaluable in supplying an intermediate service, where the traffic is too heavy for the coaches and too light for steam trains, or, in cases of light traffic, where good highways are not available.

In this manner, the utilization of rail motor cars has been greatly extended. Studies of the possibilities, coupled with ingenuity in the assignment of the cars, have brought the average mileage per day to relatively high figures. Averages of 200 to 300 miles are by no means uncommon and one road, using rail motor cars in



A 600-hp. Rail Motor Car Equipped with Two 300-hp. Westinghouse Oil-Electric Power Units

various kinds of services, now averages 122 miles per day with all of its newer cars, including shopping periods and several runs that are necessarily short. In each of these instances, the rail motor car is performing service formerly rendered by steam trains and performing it at an expense substantially less than that incurred in steam train operation.

The basic advantage of the rail motor car, in comparison with the steam train, lies in its economy. This economy is the result not only of the cheaper fuel which rail motor cars use, but of reductions in the maintenance and operating crews necessary, and of the reliability of the units, reducing requirements in the way of stand-by equipment. A committee of the Motor Transport Division found the cost of operation of a two-car steam train to be 69.83 cents per mile and the cost of operation of a rail car, without trailer, to be 48.50 cents per mile, this latter figure including interest, depreciation and taxes. The cost of the addition of a trailer to the rail car was found to be 2.37 cents. Comparative costs will vary, of course, on individual railroads. The Boston & Maine, a large user of rail cars, has found, for example, that, without charging for roadway or maintenance, two rail motor cars can be operated for the cost of one steam train. This road has found the cost of train operation to be $1.589 a mile and the cost of a rail motor car to be $0.72 per mile. A study on another road has produced train operating costs of 82 cents a mile, and rail-car operating costs, representing an 85-ton, 275-hp. gas-electric unit, of 46 cents per mile. The major differences are found to lie in wages, fuel, and repairs. Train wages of 28 cents per mile compare with rail-car wages of 17 cents a mile; train fuel of 28 cents a mile compares with rail-car fuel of 18 cents a mile; and train repairs, including labor and material, of 21 cents a mile compare with rail car repairs, including labor and material, of 5 cents a mile.

In Next Week's Issue

The installation and operation of adequate protection at highway crossings, without incurring unreasonable operating expense, deserves the study of railroad officers, when it is considered that such costs average as high as $3,272 annually per mile of line. Methods of reducing operating costs at the 30,287 crossings now protected, as well as what to do with the remaining 210,386 crossings in the United States not now protected by other than fixed signs, will be explained in an article in next week's issue.

Large Savings Accomplished

That these are actual rather than theoretical economies, is proved by the experience of railways using rail motor cars extensively. The Chicago, Burlington & Quincy is a good example. This company operated 57 rail motor cars during 1930, with a rail motor car mileage of 3,341,004. Operating expenses saved, through the operation of these cars in place of steam trains, were $699,290, train operation having cost 57 cents per mile. Rail motor car operation costs 27 cents a mile and, including interest and depreciation, the cost was only 36 cents per mile. These rail motor cars earned 28.5 per cent on their investment during 1930. Economies were obtained through fuel and water expenses saved, crew expenses reduced, and saving of locomotive maintenance, engine handling at terminals, fuel stand-by losses and cinder-handling expenses. The average availability of these Burlington cars was 94 per cent.

In the East, the New York, New Haven & Hartford is operating 36 rail motor cars and thereby saving approximately 50 per cent in the expense of providing certain passenger service. These rail cars have released 36 locomotives and 72 wooden coaches. These cars cover 2,760 miles daily, the runs ranging from 46 to 220 miles, averaging 98.5 miles per day. The New Haven uses rail cars on lines where the traffic is too heavy for motor coaches, or where the roads are not suitable for highway operation.

The Lehigh Valley operates all local passenger service with rail cars, utilizing 26 rail cars of various types, ranging up to 600 hp. Demonstrating the dependability of these cars, the Lehigh Valley has 24 of its 26 cars regularly assigned, only two being held for use in emergency. The Lehigh Valley finds that the saving in operating expenses resulting from the substitution of rail cars for steam trains pays for the rail car equipment in 30 months.

Since 1925, all passenger train service on the Cincinnati Northern has been provided by rail cars. While eight locomotives were required to provide the service under steam operation, now only four motor trains and one stand-by steam locomotive are needed. The cost of operation of the steam trains was 87.07 cents per mile, while the cost of operation of the motor train is 55.04 cents per mile, the Cincinnati Northern saving 29.03 cents per mile through the substitution.

The losses suffered by the railways through the continued provision of passenger service in the face of greatly diminished passenger revenues, are of considerable magnitude, of such magnitude in fact that the railways as a whole, and the railways indivdually, cannot afford to accept them without a struggle. Some unremunerative train service can perhaps be eliminated, but regulatory commissions have steadfastly maintained that the elimination of all passenger service, even on lines where the available business has approached the vanishing point, may be done only as a last resort. Where the traffic is light and where service must be maintained, the rail motor car offers a means of continuing railroad service at the lowest expense.

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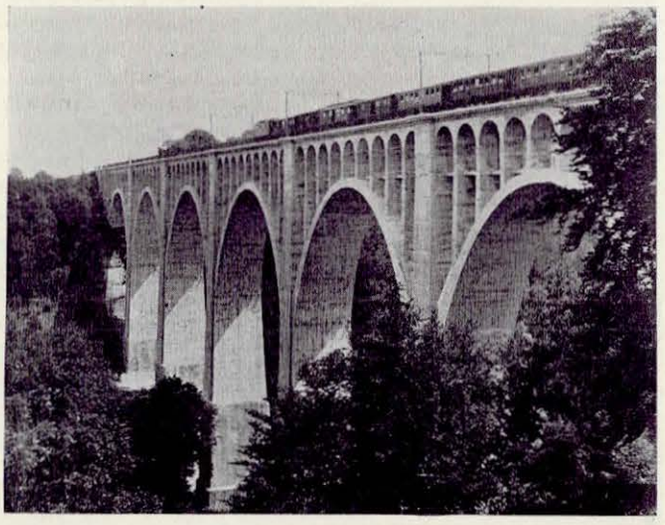


Courtesy Swiss Federal Railroad

The Grandfey Viaduct at Fribourg, Switzerland, on the Swiss Federal Railroads

The Motor Truck—
A Threat and an Opportunity*

By J. R. Turney
Vice-President, St. Louis Southwestern

TO railroad men, Heaven is a place where there are no motor trucks, and a future Hell holds no fears.

For the first time in its history, the railroad faces a competitor who challenges its supremacy. Not a day passes but, by new applications of this modern instrumentality, our rate structure is further disrupted and our business filched. The seriousness of the situation cannot be exaggerated.

The l.c.l. merchandise originated by railroads in 1929 was but 28 per cent of that originated by them in 1916 or in any of the succeeding five years. There was a further decline of 17 per cent in 1930. During the last decade, merchandise originated in carloads increased 30 per cent. The relative amount of merchandise available for transportation, measured by the Bureau of Census Production Ratio, increased during the same period 50 per cent. This increase was due, doubtless, in a large measure to the growing tendency of merchants to buy upon a daily rather than a seasonal basis. If the l.c.l. merchandise tonnage in 1930 had been equal to that in 1920, the gross revenue of American railroads would have been increased 5 per cent. If the carriage of merchandise by rail had increased at the same rate that the production of merchandise increased during this period, rail revenues would have been 11 per cent greater, or in money over one-half billion dollars.

Accepting Defeat

The competition of the motor truck is as serious for carload freight as it is for l.c.l. or parcel traffic. Millions in revenue are also being lost by the diversion of thousands of carloads of automobiles, tires, cotton, cottonseed, livestock, vegetables, fruits and other farm products, and miscellaneous manufactures from the rail lines to the trucks. Unless some way is quickly found to stop this drain of our traffic, disaster must follow. Out of the resultant chaos and babel in railroad circles, three remedies are being voiced, two vociferously. Recently a third has begun to make its puny voice heard. The remedies are of defeat, of despair, and of self-reliance.

The defeatist would concede that the motor truck offers a better mode of transportation than the railroad, and the latter's only hope of salvation lies in persuading the people to tax or legislate their more efficient competitor out of existence. The demand is an echo of that heard when the cotton spindle met the spinning wheel, and again when the railroad challenged the stage coach and steamboat. It is an attitude of cowardice which will fail in this generation even as it failed in those. If and to the extent that the motor truck is a better or cheaper transportation instrumentality, it will and should supersede the train. Man has yet to refuse to accept a more efficient tool of his genius merely because it renders obsolete his present tools. Otherwise he would still be using stone hatchets. Such laws as are necessary to make the highways safe for public travel and to protect the highways against undue wear by limitations of size, speed, safety and type together with special taxes for the use of the highways, will be demanded by the public in its own interest. Any attempt by the railroads to use this public sentiment as cover under which artificially to perpetuate obsolete facilities and practices will in time most severely react upon themselves.

The Voice of Despair

The voice of despair sings in the same choir with that of defeat. It urges that the trucks be shackled with the same red tape and regulation as the railroads are shackled. It views industrial progress in transportation as a game conducted solely in the interest of the players and, therefore, proposes to handicap the trucks, but solely in order to equalize the competitive opportunities of the two kinds of carriers. The same purpose could be much better accomplished by liberating the railroads of some of the governmental interference under which they now labor. Indeed the present is an opportune time to revise our entire scheme of regulation. For nearly half a century, this country has been engaged in

Mr. Turney Says—

"The railroad faces a competitor who challenges its supremacy . . . . Let us stop deluding ourselves that somehow, somewhere, somebody will solve this truck problem for us . . . . To meet this situation, the railroad must rely upon itself . . . . Fifty years, during which competitor after competitor has successfully invaded our merchandise traffic, ought to make us suspect that something is wrong with our service . . . . The keystone of the success of the truck is that it can and, in many cases does, consistently give overnight service within a range of 350 miles . . . . The freight train is a miserable excuse as a distributor of parcels . . . . The railroad l.c.l. classification is modern Doomsday Book . . . . We must divorce our l.c.l. rates and rate making from our carload rates . . . . The railroad is capable of much better service than we now obtain from it . . .. . I believe that the railroads have within their grasp the opportunity again to attain the dominance in transportation which they formerly held."

* An address delivered before the Associated Traffic Clubs of America at Tulsa, Okla., on October 28.

a vast experiment of government regulation of the railroads. The original laws were based on the sound economic principle that the railroads, as quasi-monopolies, should be prevented from practicing extortion and discrimination. In recent years, this principle has been abandoned for that of administrative control of operations by bureaus. Our legislatures, year after year, in an attempt to bolster up a failure due to the inherent shortcomings of this false economic theory, have passed more and worse laws. Today the authority of management largely resides in governmental bureaus on the one hand, while on the other hand complete responsibility is borne by the dehorned railroad executives—so-called.

Nor will an impartial survey show that these extreme measures of governmental interference have accomplished any public benefit which would not have been accomplished by the basic statutes themselves. That rates after 30 years of regulation are no more reasonable or non-preferential than they were before the government took over the job, is shown by the reports to Congress of the commission itself. Thus in 1930, when dealing largely with rates which it had previously considered or fixed, the commission found four times as many instances of discrimination as it did 20 years before when dealing wholly with carrier-made rates. Laws are necessary to insure reasonable and non-discriminatory rates and practices. A special tribunal to enforce those laws is equally necessary. Those laws, however, could be embraced in the space now required for the index to the commerce act, and the tribunal should be quasi-judicial instead of an administrative bureau. Manifestly if the public interest requires regulatory laws and a regulatory tribunal for one class of common carriers, it requires the same laws and same jurisdiction for all classes alike—railroads, trucks, forwarders and domestic water carriers. The present intolerable condition in which we find one carrier tied down and its competitors, including the United States government, wholly unfettered is as repugnant to principles of common honesty as it is to those on which our government was founded! But even when obtained, such equality before the law would fall far short of meeting the truck problem. Of the three million motor trucks now operating, less than six per cent are common carriers and more than 80 per cent of all highway freight is borne by privately-owned or operated trucks which under our constitution are immune from state or federal regulation.

No Improvement in a Century

Let us stop deluding ourselves that somehow, somewhere, somebody will solve this truck problem for us. When you discarded your toy fire engine and your tin soldiers, you quit expecting visits from Santa Claus and his reindeer. To meet this situation, the railroad must rely upon itself. If it is futile to ask that the red tape which is throttling our progress be removed, it is more than hopeless to expect Congress to rescue us by paternal legislation, or shippers to patronize a poorer or more costly service merely because of our need for the business. No such condition faces us. Every click of singing wheels on our magnificent steel highways ought to beat into our craven hearts the message that the railroad is not whipped; that in it we have the most efficient and economical carrier in the world; and all that is necessary in order for it to render a service incomparably better and cheaper than any competitor is for those of us who use it to adapt it and ourselves to modern progress. Only by this means can we hope to retrieve our lost traffic.

Why is it so easy for the trucks to take our l.c.l. traffic? The answer is not hard to find. Originally American railroad traffic consisted largely of l.c.l. business distributed from sea or river ports. The railroads made possible industrial development in the interior which called for cargo loads. Furthermore, through the imposition of added volume upon the existing plant by means of larger cars, heavier loading, longer trains and fewer train-miles, the railroads improved their carload service until they became the dominant transportation utility. On the contrary, however, little or no improvement has been made in our merchandise service in a century. For the most part, we handle it as we did when we operated wood-burning locomotives on wooden axles. We abandoned the way-freight as obsolete for through carlot service only to make it the backbone of an l.c.l. service which is not much better than it was when trains tied up for darkness and a speed of 15 m.p.h. was tempting Providence.

The railroad, during a century of inertia, has surrendered its parcel traffic to each succeeding competitor which has arisen to challenge it. First, the express messenger, sensing the railroad's failure, met the demands of its parcel patrons by expanding his 18-in. portfolio into a 70-ft. express car. Next, the parcel post met the demand for the carriage of still smaller parcels which both the express company and the railroad scorned. Then came the freight forwarders and consolidators who, through superior management, take our traffic from us by using our own facilities more efficiently than we use them ourselves. Now while we whistle in the dark the trucks are taking what is left of our parcel business.

Fifty years during which competitor after competitor has successfully invaded our merchandise traffic ought to make us suspect that something is wrong with that service. The irony of the situation is that three of these competitors use our own facilities to give a better service than we give. The trucks themselves are beginning to awake to the fact that they can do the same thing. The fault, therefore, lies not in the railroad facilities but in our own failure to use them intelligently. The progeny of this century of inertia are inept containers, wasteful packaging, incomplete carriage, inflexible schedules, interminable delays, wasteful practices, nonbearable rates and an unintelligent classification.

The railroad has attained the economy of the heavy trainload only at the expense of increasing the size of its cars and the weight of its carload. So long as our patrons bought seasonally, this constant increase in the size of the freight container was an advantage rather than a handicap. But our patrons no longer buy seasonally. Ours is the day of reduced inventory and hand-to-mouth buying. Our cars have become entirely too large for the purchase needs of many of our patrons. The result is that our average box-car load is about 50 per cent of its capacity, and it costs us more to haul our box cars than it does the freight they contain. The truck takes the business by affording a flexible container in units of approximately one-fourth carloads. The railroads are confronted with the choice of losing a substantial part of their carload business, or of radically reducing carload minima, without, however, sacrificing operating efficiency by diminishing car and train loads.

Cars Poorly Designed for Work They Have to Do

Only by an increase in size and weight does the container which we offer for the transportation of parcel freight differ from its predecessor—the ox-cart. Ignoring the progress in shock absorption which has been made by other industries, we insist that the ship-

per, at great expense to himself, make our container safe by a packing which will protect the shipment against anything short of an earthquake. Our past experience with express and parcel-post service ought to have opened our eyes to the fact that our container was not suitable for parcel traffic. If they have not been opened by the trucks, we are indeed blind. The truck offers a container admirably suited in size for the transportation of parcels and built on modern, scientific principles of shock absorption. As a result, it dispenses with the need for these rigid packing requirements and, therefore, saves the shipper not only time but the expense of complying with these requirements which in some cases exceeds the freight charges. There is small wonder that the truck is playing hob with our merchandise traffic.

A *Complete* Service Essential

An essential requirement of a successful parcel-freight service, and one shirked by the railroad but met by all competing agencies, is the requirement of complete service. Other than the fact that we have never done so, there is no reason against and every reason why the railroad should transport freight from warehouse to warehouse. From the shipper's standpoint, it is difficult indeed to understand why he should be put to the trouble and inconvenience of making three contracts—one with the railroad and one each with draymen at each end of the line, when the railroad holds itself out as a carrier. Store-door pickup and delivery explains why many a former l.c.l. patron has sought the complete service afforded by the trucks. Railroads, years ago, by means of private sidings afforded warehouse-to-warehouse delivery to a large number of carload shippers. Until recently a substantial part of our patrons utilized team tracks and bore the cost of transfer of carload freight. The truck meets their needs and saves them inconvenience and expense by backing the container up against the warehouse dock.

The railroad dealing in the movement of a large number of cars between many points cannot accommodate itself to the needs of the individual shipper. It therefore seeks to make the shipper conform his operations to the railroad's schedules and practices. These schedules frequently make it impossible to give overnight service where it is demanded but not in sufficient volume to justify an additional train. In such cases the service suffers. This is not true of the truck. The only consideration which determines its schedule, particularly in the handling of carload freight, is the requirements of the particular shipper.

Except in comparatively rare instances, the methods of the railroads are conducive to delay rather than speed in transportation. Since there is rarely co-ordination between the drayman and the railroad, a failure upon the part of the former to reach the freight house before the closing hour, may result in a 24-hour delay. Few appreciate the time required for the movement of cars through our terminals. Of the total life of a freight car, approximately 90 per cent is spent in terminals, switching, loading, unloading and around shops; only 10 per cent is spent in line haul movement. No small part of the blame for this situation is due to the railroad's insistence that freight be brought to its right-of-way. As a result, it has been compelled to construct expensive freight-house terminals adjacent to the commercial center of the city, thereby encountering congestion and impeded movement. Again, unless the shipment is destined to a break-bulk point, days may be required for its transfer to the way-freight which will eventually deliver it. When it finally reaches destination, it must be warehoused while the consignee is notified of its arrival by mail. It spends an average of 36 hours awaiting the delivery drayman. While in line haul the shipment may have attained a speed of 35 to 40 m.p.h., yet due to these archaic methods of handling, the overall speed of the movement from consignor to consignee is under 10 m.p.h. Compare this service with the truck. It calls for the shipment. It does not play tag about a congested terminal but as soon as it is loaded it hits the pike. On through overnight runs some of these trucks attain an average overall speed of 30 m.p.h. On distributing runs, they average 20 m.p.h., including stops for deliveries. They deliver the goods immediately upon arrival. The keystone of the success of the truck is that it can and in many cases does consistently give overnight service within a range of 350 miles.

While the freight train is ideally designed for the distribution of cars, it is a miserable excuse as a distributor of parcels. There is hardly any rail operation which is as extravagant as the distribution of l.c.l. freight by a local or way-freight train. Our average load of l.c.l. is less than five tons in a container whose net capacity is 40 tons and whose tare weight is 20 tons; that is, we haul four pounds of car for each pound of l.c.l. freight. Consider the utilization of at least a hundred thousand dollars worth of equipment and the time of at least five men to unload a hundredweight of tobacco on which the total freight charges are far less than the cost of unloading it. A truck can and does perform the distribution service of parcels at way-stations far better and cheaper than the train can possibly do it. Again, where overnight service is required, a volume of traffic insufficient to warrant an additional train at a cost of several dollars per train-mile is more than sufficient to warrant several truck units at a cost of 30 cents per mile.

L.C.L. Classification Is Unintelligible Jargon

The freight rate structure of this country is basically a value-of-the-service structure. To use a more descriptive but opprobrious term, our rates are what the traffic will bear. This is necessarily so because our raw materials moving long distances must do so at rates close to the marginal cost of transportation in order that they and their products may compete in world markets with the products of other countries which are largely water-borne. As a consequence, the rates upon other traffic, and particularly upon high grade traffic, are higher than they would be if constructed solely upon a cost basis. Since manufactures provide the revenue out of which the carriers, in the last analysis, must exist, any depletion in that traffic can be attended only by serious consequences, particularly to the shippers of low-grade commodities. The trucks have taken advantage of this characteristic of our rate structure and have made the rates upon high-rated commodities lower, and in some instances much lower, than the rail rates. While the consequences from a revenue standpoint as well as in the effect upon the lower-rated commodities may prove far-reaching, the truck cannot permanently compete with the railroad for carload traffic because the railroad, as we will hereafter see, can handle traffic cheaper than the truck, and, therefore, can undersell it.

Other parcel carriers, including express, postal and truck, have simplified their classification and their rate structure. The railroad l.c.l. classification comprises 700 pages of unintelligible jargon which no layman understands and about which no two experts can agree. It is a modern Doomsday Book. It discourages l.c.l.

traffic by its lack of intelligence, its illogical ratings as well as by its illiberal packing requirements. Under the value-of-the-service theory, wide variations in carload ratings are necessary. Since, however, the l.c.l. traffic is but 10 per cent of the traffic, the need to apply such a theory to it is not apparent, particularly in view of the fact that although the variation between the highest and lowest l.c.l rating is 700 per cent, that between the average rating (weighted by revenue) and the lowest rating is but 12½ per cent.

Overcoming a Century of Stagnation

Our red ball freight trains carrying full tonnage frequently attain an average speed between terminals of 35 to 40 miles, and actual maximum speeds of 60 miles per hour. Their over-all speed, including terminal delays, exceeds 20 miles per hour. The express and parcel post utilize passenger schedules and attain average over-all speeds from 35 to 40 miles per hour. In more recent years, limited merchandise trains have attained the same average speed. The truck, save under the most favorable conditions, cannot attain an average overall speed greater than 30 miles per hour. The railroad, therefore, has it within its power to outdistance the truck if some way can be found to overcome its terminal handicaps.

Excluding pick-up, delivery, overhead and general expense, the most economical truck unit, consisting of tractor, semi-trailer and four-wheel trailer having approximately the cubical capacity of a carload, will cost not less than 25 cents per mile to operate. The average out-of-pocket cost per rail car mile is six cents, which excludes all terminal expense. I use out-of-pocket costs simply to obtain a common basis of comparison. Furthermore, an additional car upon the train can be added without greatly increasing the cost, while each new truck unit means the complete duplication of the cost.

While the truck is superior to the train in flexibility, in size and kind of container, terminal speed and as a distributor of parcels, it is hopelessly outclassed by the train in line-haul speed, cost and capacity. The bare statement of these facts which are almost self-evident compels the conclusion that the railroads need only modernize their practices, efficiently utilize their rail facilities for line haul, and supplement them with trucks in the limited terminal and distributive spheres within which the truck is obviously superior, in order to render a cheaper and better service than a competitor operating wholly by truck. A modern, co-ordinated transportation will recoup the freight traffic which has been lost not only to the trucks but to the express agency, parcel post and forwarders as well. The steps necessary to furnish that kind of railroad service seem radical only because of the stagnation of a century to overcome, in both the operating and traffic departments.

A co-ordinated parcel service will postulate that our operating men and their technical advisers should take advantage of every improvement in the science of transportation, whether directly connected with railroads or not. It will require the designing of a new kind of sectional box cars, equipped with the most modern shock-absorbing devices, with bodies which are quickly interchangeable between rail car and truck. It will mean that through the use of these sectional car-bodies, the trucks will do a large part of the switching now done by rail. It will mean also that the train will perform the terminal-to-terminal movement, handling and distributing cars, and that the truck will perform the terminal movement, handling and distributing parcels. It will permit the abandonment of expensive urban freight house terminals and the substitution of transfer platforms located in outer terminal yards, over which parcel freight will be transferred between cars and trucks. Finally, l.c.l. transportation will be largely if not entirely divorced from carload transportation, and a new limited l.c.l. freight train operating on a passenger schedule will appear.

Higher Net from Lower Rates

If what I have described is unorthodox operation, that which is to come is nothing short of traffic heresy. We must divorce our l.c.l. rates and rate making from our carload rates. They have nothing in common. Our complicated l.c.l. classification is as out of place as a corset at the seashore and ought to be as extinct as a miniature golf course. Our l.c.l. rates ought to be stated in not more than two classes and in zones as large if not larger than the parcel post zones. They should provide for the handling of all parcels of whatever size larger than a letter. We should insist on a simplified accounting with respect to parcel freight and if possible install a system approaching as nearly as feasible the use of zone and weight stamps. Finally, to meet the carload situation, we must revise our minimum weights to accord with the new sectional cars and wherever necessary reduce our rates on high-rated commodities to the level of the truck rates. Such a step, so far from reducing the carrier's revenue, by increasing our load per car and reducing the ratio of tare to net load, will actually increase our net. For instance, two half cars with a minimum weight of 25,000 lb. each will produce more net revenue on a fourth-class rate than one car with a minimum of 30,000 lb. at the third class rate.

Such co-ordinated service will be of immense benefit to the public. It will provide it with one transportation agency capable of transporting anything from a package of carpet tacks to an electrical transformer. This agency will afford a speed in freight service yet unattained by any other form of transport and with the dependability and reliability of the railroad, and since traffic will be regained in substantial volume it ought also to result in cheaper transportation. A final but by no means the least benefit to the public is that it will greatly diminish the number of trucks which are now hogging our intercity highways and at the same time greatly reduce the number of switch-engines which are blocking our city streets by transferring the load of the line-haul to the rails and the load of the switch-engine to the truck.

While I may have been harsh in my criticism of what I consider to be the shortcomings on the part of the railroad, it is only because I believe it is capable of so much better service than we now obtain from it. While the railroads are now surrounded by competiting agencies which threaten them on every hand, I for one believe that the railroads have within their grasp the opportunity again to attain the dominance in transportation which they formerly held.

CARNEGIE HERO MEDALS have been awarded to two employees of the Chicago & North Western for saving the lives of people endangered by moving trains. Both men were awarded bronze medals and given the sum of $1,000, to be paid as needed for a worthy purpose by the Carnegie Hero Fund Commission. Charles Henry Murphy, Fond du Lac, Wis., a conductor on the Lake Shore division, saved Mrs. Fred Fraser from being killed by a train at Appleton, Wis., on May 14, 1930, when he jumped to the track and rescued her from an approaching train. Oliver Diehl, a station baggage and freight handler at Morrison, Ill., saved the life of Henry Elmendorf at Morrison, on December 9, 1929, when he ran in front of the approaching Overland Limited and rescued the man.

Swing Draw Span During Erection

By F. J. Bishop

Engineer of Bridges, Buildings and Signals, Toledo Terminal

Unusual methods were employed in renewing the superstructure of the Lower Maumee River bridge at Toledo, Ohio

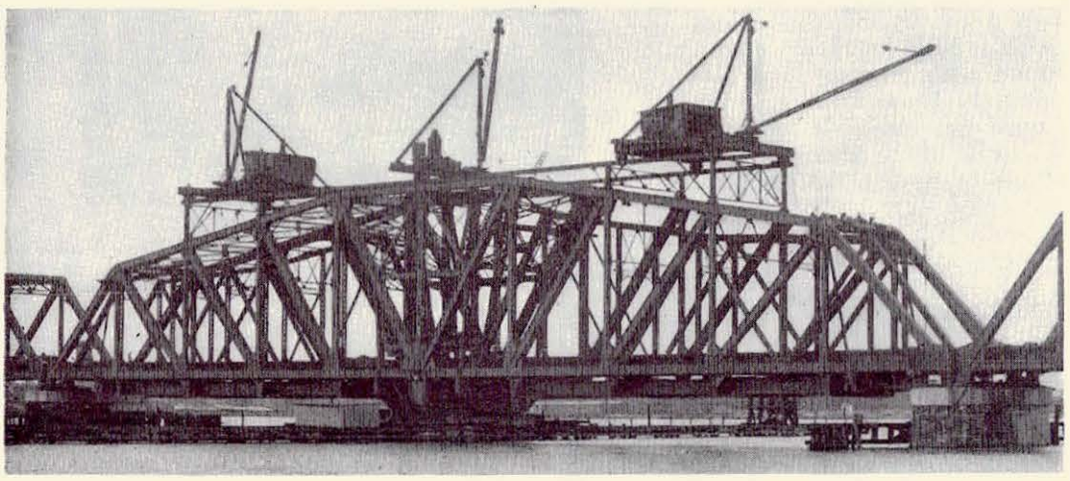
After the New Spans Had Been Erected to the Right of the Old Spans, Cantilever Beams Hung Under the New Spans Were Used to Support the Old Spans During the Lateral Shift and While the Old Spans Were Being Dismantled

TWO expedients not ordinarily attending the erection of a bridge were adopted in the renewal of a single-track bridge at Toledo with a double-track structure on the same site. One of these embodied the erection of a new through-truss swing span around the old span in such manner that the two spans could be swung as a unit to accommodate navigation as the erection proceeded, the channel being closed only for one month while the new center and machinery were placed under the old span. The other innovation was the supporting of the old fixed spans from the new ones, which were erected alongside, thus precluding the need for falsework to support the old spans during the lateral shift and subsequent dismantling.

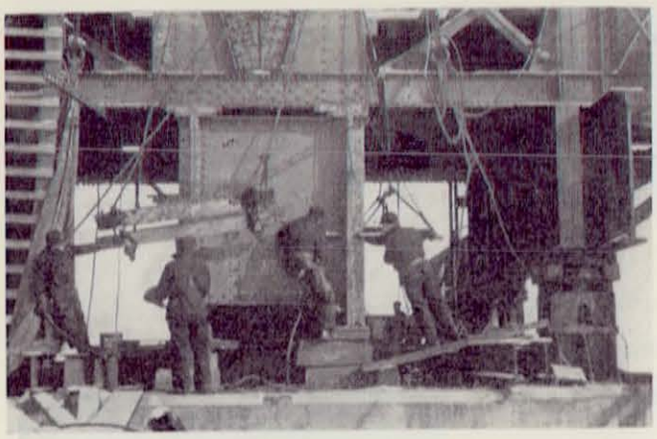
The bridge in question, known as the Lower Maumee River bridge of the Toledo Terminal, carries the tracks of the Toledo Terminal across the mouth of the Maumee river. All lake shipping entering and leaving Toledo passes through the bridge. The rail traffic consists of about 80 freight trains in 24 hours, no passenger trains using the structure.

The original single-track bridge built for Cooper's E40 loading, consisted of pin-connected, through-truss spans as follows:—Three 204-ft. spans of eight panels; two 152-ft. spans of six panels and one 353-ft. 4-in. swing draw span of the rim-bearing type. These spans rest on a stone and concrete substructure that was recently reconstructed as described in the *Railway Age* of February 22, 1930.

The new superstructure consists of double-track through-truss spans of the same length as the spans they replaced, with the addition of a 60-ft. deck girder approach span at each end. The new swing span is of the center-bearing type. The new structure was designed for E70 loading and has a total length of 1,415 ft. from backwall to backwall of abutments. The tracks on the structure are level and tangent and approach from both ends on earth fills about 700 ft. long. The draw span is electrically operated, the main source of power being supplied through submarine cable. A gasoline-driven generator was provided to furnish power in case of failure of the main supply. Separate 50-hp. motors were installed at each end of the swing span to handle the lifting type rail locks and drive the end wedges. These motors are equipped with solenoid brakes and limit switches so that when wedges are



Placing of New Center and Turning Machinery and Symmetrical Erection of New Trusses Around Old Ones, Made It Possible to Turn the Draw Span at All Times During Erection of the New Structure and Dismantling of the Old Steel



Placing the New Center Loading Girders Under the Old Span

fully driven the power is cut off and the motors stopped in the correct position, regardless of the position of the operator's control lever. The position of the wedges and rail locks is also assured by mechanical and electrical interlocking with the signals controlling train movements over the bridge. The turning and center-wedge motors and gear trains are located under the deck in the center of the draw span. The turning machinery is designed virtually as two duplicate units, each driven by a 50-hp. motor, these motors being further interchangeable with the end-wedge motors. The turning motors are equipped with special electrically-operated brakes, a compressed-air release being provided to guard against a power failure and a sudden stopping of the draw while being opened or closed.

The machinery is designed to swing the draw through a 90-deg. arc in 90 sec. While every operation of the draw is interlocked to provide for the correct sequence of the various functions, the draw can be swung through a full circle in either direction. This provision materially reduces train delays resulting from the opening of the bridge as it enables the operator to swing the span ahead of a boat in opening and follow it with the draw in closing. It is often possible to keep the span in continuous motion during the passage of a boat, thus reducing materially the elapsed time required to open and close the draw.

Erection

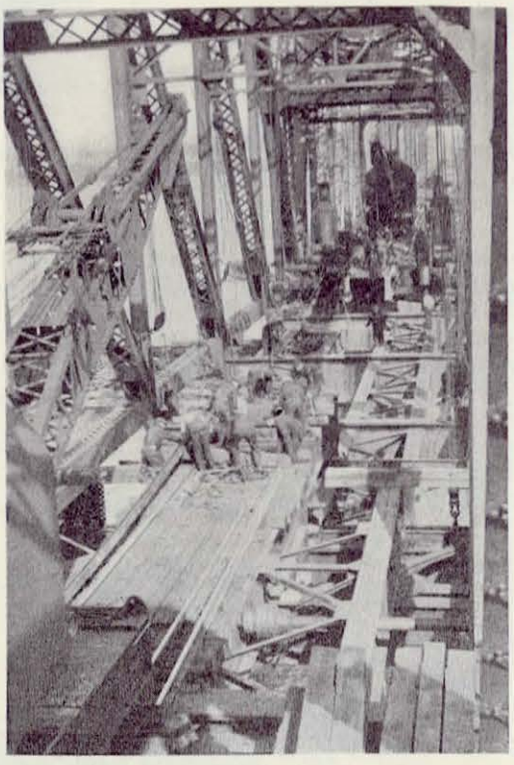
After a careful study of both the rail and water traffic it was determined that the rail traffic demanded that the bridge be in practically continuous service except for an occasional period of two to three hours. River traffic operates through the draw during the full year except for a period of about 30 days beginning January 1. It was evident from this study that the various spans had to be erected with as little interference with rail traffic as was consistent with economy and also that the river channels could be blocked for a period of only 30 days. This period was obviously too short to permit the use of falsework in the channels as it would have been impractical to have placed and removed such falsework in winter weather in so short a time.

The fixed spans were, therefore, erected on timber falsework on the downstream side of the old bridge, access to the new structure being obtained by the construction of tracks independent of the main track. As each span was erected, the falsework between piers was taken down and moved ahead to the next span. Heavy beams hung below the new spans at each intermediate panel point and cantilevered laterally under the adjacent old spans furnished the support for the old spans during the shifting of the spans and until the old spans were dismantled. Each new fixed truss span was erected on rollers, and when ready for the lateral shift, was raised enough to lift the old spans clear of the bridge seats. The new spans were then rolled into final position, carrying the old spans with them. The old spans were dismantled with the aid of a derrick on the top of the new spans and the use of a temporary track in the position of the new or second main track. The dismantling operations were thus carried on without traffic interference. The average time that traffic was suspended during the rolling operations of the five truss spans was 3 hr. 59 min.

Swing New and Old Spans Together

The erection of the draw span was considerably more difficult because, in addition to maintaining rail traffic, it was necessary to make provision for the passage of boats at any time except during the month that navigation was suspended. To meet the difficult erection

(Continued on page 708)



Lifting Three Panels of the New Floor in One Operation

The New Double Track Bridge

Centralized Control of Freight-Car Interchange Advocated*

Practicability and advantages pointed out in Chicago Car Foremen's Association address

By T. W. Demarest

General Superintendent of Motive Power, Pennsylvania, Western Region

CAR inspection may be roughly divided into interchange inspection and transportation yard inspection, interchange inspection being again divided between that at large centers, such as Buffalo, N. Y., St. Louis, Mo., Kansas City, Mo. and Chicago, and that at outlying points where there may be not more than one railroad connection. In so far as the latter is concerned, it is the simplest to handle and directly under the control of each railroad. A simple analysis of the number of cars interchanged daily, the general condition of the cars interchanged, and the time utilized in interchange, will indicate at once whether such expense is justified. Many such interchange points may be found and unjustified expense which can be eliminated.

There is a more complex situation, however, at the larger joint interchange centers, and little can be done except to see that the employees of the respective bureaus are restricted to absolute requirements. The answer to this expense lies much further back, starting with the condition of the car at the time set for loading. If we all took the position that no car would be set for load except one fit to go to destination, that neither traffic nor any other consideration would be allowed to interfere, outlying interchange inspection as well as central interchange inspection would be vastly simplified. I have begun to feel strongly, particularly with the growth of perishable shipments, that our rules in relation to shipping a load, with respect to the receiving line being compelled to take a car and load when certain defects exist in the car, are an undue penalty on the receiving line and constitute an excuse for the delivering line turning over defective equipment, throwing the burden of extra per diem and detention to the load on the line which is not responsible for the condition.

The perishable business is handled in arranged-service movement with scheduled departure and final destination arriving times. The deliveries are on close time and it does not take much interference to throw the car and load out of step. I am practically prepared today to advocate, with the exception of loads destined to points inside the switching district, a complete reversion of the rules, compelling the delivering line before interchange to put the car and load in such condition as will permit it to go not only through interchange without delay, but also to destination without delay. Does someone say it can't be done, that this is a step backwards? Let's see what has been done in Chicago since December, 1930, in this direction and under the present rules by simply calling the attention of the delivering line to each individual case. The delayed perishable loads delivered in relation to the perishable load interchanged decreased from 1 in 111 cars in December, 1930, to 1 in 453 cars in August, 1931—a notable result, which was accomplished without abrogating any of the interchange rules, or the effort to move bad-order loads to the delivering line on a so-called record basis.

The question has been asked me: "Is there any necessity for a variation in interchange rules at different terminals?" I answer unhesitatingly: "No". It takes no more time to make out a defect card than it does to enter a record of the condition of a car in a book. The defect card is a permanent record and cannot be evaded. It constitutes a protection to the receiving line without the necessity for expensive tracing, which too frequently produces most unsatisfactory results.

The receiving line should not be put in the position of having to assume the obligations of the delivering line. Once more, real economy through interchange centers and freedom for prompt road movement can only be obtained by setting for loading a properly-conditioned car; by the delivering line turning over to the receiving line a car that is fit not only to go through interchange, but also conditioned to go through to destination.

I don't claim any more than any of you that the present interchange rules are perfect. Some of them I don't like, but don't forget that the rules exist today and were made today by you gentlemen, yourselves. There isn't a rule in the book that wasn't put in there because some fellow tried to beat the rules. You may say that they are too technical. If they are, it is because you and I are technical. I have been on the A. R. A., Mechanical Division, Arbitration Committee, for 28 years, and I have been trying to help write rules and change

"We are never going to have a successful mechanical car maintenance with free interchange movement without interference until (1) full interchange authority is placed in the hands of a central bureau not subservient to local officers or rules; (2) inspection is based on car condition and lading set to go to destination, with the delivering line compelled to assume its full obligation in this respect; (3) all roads unite in an honest effort to abide by the spirit of the rules."

* Abstracted from an address entitled "Car Department Problems," presented by Mr. Demarest before the Car Foremen's Association of Chicago at the Hotel Great Northern, Chicago, October 12, 1931.

them for that length of time. I have simply come to the conclusion that we are not satisfied if some of us cannot twist the meaning into something else. The first thing we do, and apparently it is an inherent weakness and human nature, when some fellow tells us we have to do a certain thing we try to find ways to beat it. That's just what happens with interchange rules.

You have a lot of questions and answers in the rule book. How do you suppose they got there? When the Arbitration Committee is considering a rule, the first thing they begin to ask themselves is: "What is some fellow going to try to do with it?" Therefore, to avoid having to answer the question to one at one time and to another at some other time, we try to view what the average human thinks about and put down the question and answer. Don't blame the rules for being technical, don't blame the rules for what they are. You and I have made them.

Lack of Compliance Rather Than Lack of Rules

While there are rules there I don't like, I don't see how to get them out of the book under the present conditions. And don't forget another thing. If there are interruptions in interchange, if somebody says the joint interchange rules deter free interchange, the question of interference doesn't result from not having rules to cover, but because of lack of compliance. Get that straight.

If we play the game, we ought to play it fair and then there will not be any difficulty in interchange and in car movement. And again, as a proof of that statement, I want you to think again of the little statement I read to you covering the shopping out of perishable loads. If we want to make a success out of anything there is only one way to do it and that is play the game. Let's look at the rules as they come to us and endeavor to figure out the spirit of the rule.

Notable Reduction in the Proportion of Perishable Loads Delivered Which Were Delayed in Interchange in the Chicago District

Month	Record of delayed perishable loads in proportion to perishable loads interchanged	The same ratio expressed in percentage
December, 1930	1 in 111	.90
March, 1931	1 in 178	.56
April, 1931	1 in 194	.51
May, 1931	1 in 259	.39
June, 1931	1 in 311	.32
July, 1931	1 in 329	.30
August, 1931	1 in 453	.22

I read a book years ago which impressed me very strongly. The book, which is out of print now, was called "Strange Case of Randolph Mason." Randolph Mason was a very bright attorney who specialized in taking cases where some fellow had infringed either the state or federal act and wanted to know how he could evade his responsibility under the act. Randolph Mason could show a solution every time. Too many of us are playing that game with the joint interchange rules. Instead of trying to evade our responsibilities under the rules, let's try to ascertain the spirit of the rules and live up to them.

"We are never going to have a successful mechanical car maintenance with free interchange movement without interference until (1) full interchange authority is placed in the hands of a central bureau not subservient to local officers or rules; (2) inspection is based on car condition and lading set to go to destination, with the delivering line compelled to assume its full obligation in this respect; (3) all roads unite in an honest effort to abide by the spirit of the rules."

Swing Draw Span During Erection

(Continued from page 706)

condition on the draw span it was determined to erect the new draw around the old single-track span in such a manner that both spans could be swung together whenever necessary. To do this it was necessary to convert the old draw span from a rim-bearing span to a center-bearing span, for the reason that the new turning machinery had to be put in place in the 30 days that the river channels were closed. The required additional members and reinforcing were all added and the new turning machinery assembled before the old turning machinery was dismantled. On January 1, or the beginning of the thirty-day period during which the river channels were blocked, all of the old machinery was dismantled, together with all the structural parts of the old span below the bottom chords, this center portion of the old span being supported on hydraulic jacks and special fabricated pedestals. The new center bearing and main loading girder were then placed in final position, after which the old draw span was shifted laterally to correspond with the center line of the new double-track draw. The complete new machinery units were assembled on skidways and rolled into final position. The old draw was then swung on the new center with the new machinery.

Had to Keep New Steel Balanced

The trusses and top lateral bracing of the new span were erected around the old span starting at the center and progressing toward each end. This was done by means of traveler derricks mounted on top of the span. In order to swing the draw for river traffic during the course of erection, the span had to be kept balanced about the center, the work progressing on both arms of the draw simultaneously. The new floor system, with the exception of the end and center panels, was suspended under the floor of the old span by providing extensions of the intermediate posts below the bottom chord into which the intermediate floor beams could be framed in a position below their final elevation. The end panels of the floor system, which carry the wedge machinery were pre-assembled and placed in final position as units, rail traffic being interrupted during this operation.

The new trusses having been completed, the new end wedges were placed and the old span was blocked up on the floor of the new span, thus relieving the old span of all load. The overhead derricks used for erecting the new trusses then worked back toward the center, dismantling the old draw except the floor. Rail traffic was then interrupted, the old floor was removed and the three panels of the new floor in each half of the span, that had been erected below final position, were raised into place. This section of the floor in each half of the span was raised as a unit.

Trains were handled successfully over the structure during the progress of the work by means of block offices at the ends of the double track on each bank of the river. These offices were connected by telephone with the dispatcher and with a phone house maintained at the center of the draw.

The structure was fabricated and erected by the American Bridge Company, under the direction of A. B. Newell, president, Toledo Terminal; J. C. Weber, resident engineer; and the writer. H. Ibsen, consulting engineer, Michigan Central, Detroit, served as consulting engineer.

Norfolk Hearings on Fuel Practices

Different coal purchasing policies revealed in evidence presented by six roads responding in that city

HEARINGS in connection with the Interstate Commerce Commission's investigation of railway fuel practices (Ex Parte 104, part I) opened at Norfolk, Va., on October 28 with Examiner C. W. Berry presiding and I. C. C. Attorney M. C. List conducting the cross-examination of carrier witnesses. As many different fuel policies were revealed as there were roads appearing in that city. Briefly, the Norfolk & Western invites bids on its fuel requirements and, with such information in hand, fixes a uniform price which it will pay to all under its yearly coal contracts; the Virginian purchases the bulk of its fuel on yearly contracts from its own mining subsidiary; the Chesapeake & Ohio invites no bids but awards annual fuel contracts on the basis of a uniform fixed price; the Richmond, Fredericksburg & Potomac makes no contracts but shops around and buys its fuel currently at spot prices; the Seaboard Air Line awards annual contracts to low bidders, considering the delivered cost of the coal on its line; the Norfolk Southern, with one mine on its line, has been taking the entire output of this mine and awarding contracts to low bidders elsewhere for the remainder of its requirements.

Generally the respondents divided the information presented in direct testimony of witnesses into five parts using the headings supplied by the commission in its notice of information to be sought. These subdivisions were: (1) The methods pursued in the selection of fuel; (2) the methods used in allocating fuel orders; (3) the bases upon which fuel prices are fixed; (4) the inspection of fuel; (5) practices in distributing and accounting for fuel. Other specific information sought was submitted in exhibit form; this latter included statements tabulating bids received for fuel, statistics of fuel performance, maps of coal producing areas, mine rating bulletins, etc. The principal bases upon which I. C. C. counsel proceeded with the inquiry were the responses made by railroads to questionnaires issued by the commission on August 5.

Norfolk & Western

E. S. Moore, coal traffic manager, was the Norfolk & Western witness. The N. & W., he testified, purchases its coal on yearly contract, its year beginning on April 1. Contracts are confined to mines local to the N. & W. There is no fixed rule, the witness continued, determining the allocation of fuel orders but a wide distribution is attempted. In general the method pursued by the N. & W. is to invite all its coal operators to bid; if the prices at which coal is offered seem generably equitable in view of market conditions, production costs, etc., a figure approximating bid prices is fixed as the uniform price per ton to be paid for all fuel contracted for during the year involved. Once a price has been agreed upon it is uniform to all mines supplying the same kind of coal. In allocating the orders, Mr. Moore explained, an attempt is made to avoid having an N. & W. fuel contract constitute the greater part of any mine's output.

As to inspections the witness said that these are made at mines and at N. & W. coaling stations while, in addition, tests and chemical analyses are occasionally conducted. The accounting for fuel is under the direction of the superintendent of transportation; the latter's office receives the bids, makes the contracts, distributes the coal, etc. The distribution plan makes the contract tonnage subject to monthly requisition.

In the cross-examination of Mr. Moore it was developed that the principal basis upon which the N. & W. determines whether or not coal is satisfactory is actual test to determine its performance in the fire box of the locomotive. Neither the B.t.u. rating nor ash content is a determining factor. The witness explained that the bulk of N. & W. locomotive fuel is high volatile coal in which he thought there was little variation in B.t.u. as among N. & W. coal fields; he did not think the suitability of coal for locomotive use could be determined by consideration of the ash content nor did he believe that the carbon content had any bearing on the N. & W. requirements.

Questioning turned to the methods used in allocating fuel orders after Mr. Moore had explained that the N. & W. has for years followed the plan of paying the same price to all mines for similar grades of coal. No mines on the N. & W., the witness testified, are served by other railroads. There is no definite plan for the allocation of fuel orders—no rigid formula, he continued. Among the factors entering the allocations are historical facts and commercial coal shipped by the mines. By historical facts, the witness explained, he meant the treatment the N. & W. had received from operators in the past, especially in times of great demand for coal; commercial tonnage, he added, enters, not in accordance with a fixed formula, but on the basis of N. & W. officers' judgment as to the relative importance of mines. In fixing prices which the N. & W. will pay no consideration is given to what other carriers are paying for fuel originating on the N. & W. Contract prices, Mr. Moore added, are about the average bid. Some lower bids are received, he continued, but the N. & W. does not propose to bankrupt its coal operators nor to allocate to any one operator or group of operators any substantial proportion of its fuel business. Coal is rejected from but few mines and such rejections are based on unsatisfactory performance after tests in the fire box.

Mr. Moore said that the lowest bid received for mine-run low-volatile coal this year was $1.85 a ton; contract prices are uniform at $2. For high volatile run-of-mine coal the N. & W. is paying $1.75 a ton; it received bids of $1.70, $1.65 and $1.55, all from small mines. The witness conceded to Attorney List that spot coal prices under present conditions would be less than N. & W. contract prices but he said that the N. & W., being interested in the welfare of its operators, wanted to pay a "fair" price. In fixing this "fair" price it considers market conditions and the cost of production in its own mines. These latter, the witness told Examiner Berry, are not now operated to capacity because the road thinks it is at present more profitable to aid in keeping other mines in production.

If coal contracts were awarded strictly on the basis

of competitive bids Mr. Moore thought disruption would result; he considered the present plan an ideal one for co-operation between the N. & W. and its operators. The N. & W. requires a special stoker coal (that which passes through a two-inch screen) of a type which operators find difficult to move and thus the more of this stoker coal an operator can sell the more lump, egg and nut coal he can produce for routing over the N. & W. Coal purchased at spot prices, Mr. Moore told Attorney List, is cheap coal—a poor quality would be delivered and difficulties would follow. N. & W. fuel inspectors, he later testified, have not had occasion to reject a car of coal for several years. He denied that there was any understanding to the effect that operators will be compensated in prices paid for N. & W. fuel for losses sustained in sales of coal to other consumers.

The examiner asked how four or five per cent of the total coal produced on the N. & W., which is involved in the railroad fuel orders, could be a material factor in the success of the mines. The witness replied that such a comparison was not valid in that the N. & W. uses mostly high volatile coal and the total production of such is but one-third of the entire production along its line.

Fuel Costs of N. & W. and Other Roads Compared

F. P. Pfahler, service agent, bureau of service, Interstate Commerce Commission, followed Mr. Moore to introduce two exhibits: One, a statement comparing prices paid by other railroads for coal originating on the N. & W. with N. & W. fuel contract prices and the other a group of photostatic copies of pages from the "Coal Age" showing spot prices of coal. The information as to what other roads were paying for coal from mines located on the N. & W. was compiled from answers to the I. C. C. questionnaire. This statement showed that mines to which the Norfolk & Western was paying $1.75 a ton for run-of-mine coal under its contract were selling mine-run coal on contract to the Atlantic Coast Line for $1.15 a ton, to the Pere Marquette for $1.40, to the Seaboard Air Line for $1.10. Spot purchases of mine-run coal from the same mines were being made by the Detroit & Toledo Shore Line at $1.25 and $1.20 a ton, by the Detroit Terminal at $1.15, by the Pennsylvania at $1.39 and by the New York Central at $1.40. From a company to which the N. & W. pays its contract price of $2 a ton for low-volatile coal the New York Central bought spot coal at $1.72.

Virginian

The Virginian presented the testimony of three witnesses—D. C. King, purchasing agent, S. M. Adsit, traffic manager, and J. C. R. Taylor, general manager of the Loup Creek Colliery Company. Mr. King testified that it has been the policy of the Virginian during the past 10 years to obtain substantially all of its fuel from the mines of its subsidiary, the Loup Creek Colliery Company. The railroad acquired this company in 1920 as a protective measure when many operators, Mr. King said, did not want to deal with the Virginian in times of high coal prices and the railroad had been forced to confiscate coal. Another factor in the decision, he added, was the desire to obtain a uniform grade of coal which is conducive to better locomotive performance. The Loup Creek sells no commercial coal itself but does lease some of its properties to other interests. Prices paid by the Virginian in 1929 averaged $1.95 a ton; in 1930, $1.93 and in the first eight months of 1931, $1.75. Mr. King said that no inspection of mines on the Virginian had been made but he was of the opinion that none of them produced coal unsuited to locomotive use. The Virginian, he added, prefers high-volatile coal and stated later under cross-examination that only two mines, local to the road, produce such coal if the Loup Creek properties be excepted.

Contracts with the Loup Creek, because of its interlocking directorate with the Virginian, are awarded in accordance with the provisions of the Clayton Act. Recently, the witness continued, from 10 to 20 per cent of the coal has been purchased from other operators at spot prices.

Attorney List brought out the fact that about half the mines on the Virginian are served also by the Chesapeake & Ohio. He then asked the witness' opinion as to the Virginian's policy and received the reply that it has been to the decided advantage of the railroad to own and operate its own mines. Using only 20,000 tons a month, Mr. King thought a parceling of this among 80 mines would be difficult. He was unaware that the policy had brought traffic losses nor did he know anything about any regrets over the policy entertained in the Virginian traffic department. Mr. King agreed that spot coal prices are at present about 40 cents a ton less than the contract price paid to the Loup Creek.

Mr. Taylor presented testimony covering production costs at Loup Creek mines. Costs are now calculated on substantially the same basis as before the acquisition, he said. The cost per ton in 1930 was $1.79. The company's mines are now being operated at about 60 per cent of capacity.

At the outset of his cross-examination by Attorney List Mr. Adsit could not say definitely that the Virginian's fuel policy had cost it traffic but he did concede that where large railroad fuel orders are involved there will be some "mutual back scratching." He admitted hearing rumors that traffic of joint mines was being diverted to the C. & O., and that operators with fuel contacts feel that they should give tonnage to the C. & O. Mr. Adsit stated it to be his personal view that it is a good idea for a railroad to buy fuel from operators on its line. He did not, however, think that Virginian operators are suffering by reason of the road's policy because they have not been accustomed to receiving railroad orders.

Favors Sale of Virginian Mines

Attorney List next asked if it were not a fact that Mr. Adsit had made a definite recommendation to C. H. Hix, president of the Virginian, that the Loup Creek Colliery Company be sold. The witness denied that he had any such definite recommendation but admitted that he had discussed the matter with Mr. Hix who understands his views. Asked if Mr. Hix concurred in those views Mr. Adsit replied that the fact that one of the Loup Creek mines has been leased indicates some concurrence. The witness would not concede to Mr. List that his views that the mines should be sold were based entirely on traffic losses which he admitted became acute three or four years ago. He would favor the sale of the Loup Creek even though no mines on the Virginian were served by other railroads.

Chesapeake & Ohio

At the outset of the Chesapeake & Ohio presentation, Attorney List introduced a statement, similar to that introduced by Mr. Pfahler in connection with the N. & W., comparing prices paid for fuel by the C. & O. with those paid by other roads for coal originating in C. & O. fields. As was the case with the N. & W., prices paid by other lines are shown in the statement to be generally less than C. &. O. contract prices.

F. M. Whitaker, vice-president, was the first C. & O. witness. He stated that this road pays a uniform fixed

price for coal to all operators; this has been the policy since 1924 and has been determined to be the best plan. For several years the C. & O. has not invited bids on its fuel requirements; a carefully compiled list of operators is kept and orders are allocated by Mr. Whitaker in conference with the director of purchases and the assistant general superintendent of transportation. High-volatile coal, Mr. Whitaker explained, has been found most generally desirable and high-volatile mines listed are inspected periodically by fuel supervisors who report to the superintendent of motive power. The allocation plan, the witness thought, is as fair and general as it is possible to make it; any operator may upon request have his mine inspected and if the coal is suitable it will receive consideration. He conceded that at times coal may be bought cheaper but nevertheless contended that in the long run the fixed price contract plan is better for the C. & O.

The present price for high volatile run-of-mine is fixed at $1.65. Prices were fixed in 1924, Mr. Whitaker explained, and have been continued on the same basis with but minor modifications. The price is fixed on the basis of general information as to production costs and costs at C. &. O. mines. The contract price, the witness continued, should pay the producers their costs, plus a reasonable profit. If competitive bidding were required, he thought, operators would offer coal at prices less than the cost of production with resulting difficulties extending to the railroad and perhaps to banks and labor. The C. & O. itself owns three mines only one of which is operating at present.

As to the relation of commercial coal traffic and fuel orders, Mr. Whitaker said that a large proportion of commercial coal is bought f.o.b. cars at mines. Thus, he explained, the purchaser is the owner of the freight and has the right to route it; over 90 per cent of coal traffic is routed by purchasers. The witness in this connection held that the consideration of shipments by operators is, therefore, not of such importance as it might at first seem.

Cross-examination of Mr. Whitaker was deferred until after the testimony of J. D. Clark, C. & O. fuel supervisor. Mr. Clark explained the specifications in accordance with which the C. & O. buys its fuel as well as the methods of distributing and accounting therefor. More than 50 per cent, he said, is delivered within 22.6 miles of the originating mines and all but a few hundred tons within 50 miles of the mines. Specifications set forth the requirements as to B.t.u., ash content, etc., and coal has been rejected because it failed to meet such requirements. Such rejections, Mr. Clark said, are few; because of the co-operation between C. & O. inspectors and the mines, cars seldom leave the mines without the coal's being properly prepared. The C. & O., it also developed, has an agreement with the Brotherhood of Locomotive Firemen & Enginemen providing that coal will be prepared to specified size before being delivered to tenders of hand-fired locomotives. The largest C. & O. fuel contract awarded for the fuel year beginning March 1, 1931, involved 220,000 tons; the smallest, 6,000 tons. The C. & O. does not store coal but keeps on hand about one week's supply.

Uniform Price Plan Defended

Under cross-examination Mr. Whitaker insisted that the fixed price contract plan is best for the C. & O. because the road obtains thereby an assured supply of the kind of coal it finds most economical to use. Also, the witness thought, the plan avoids any appearance of discrimination or preference as between operators—the price is uniform and orders are distributed on the basis of the producers' ability to supply the desired fuel.

A "fair price" the witness defined as one which was fair both to the operators and to the railroad. The C. & O. gives no consideration to prices at which coal is sold by the same operators to other consumers and Mr. Whitaker readily agreed that lake cargo coal has recently been sold at considerably less than the C. & O. paid the same operators. Also, he knew that other roads buying fuel from mines on the C. & O. pay less than the C. & O. contract prices; he knew of some roads who were buying coal from C. & O. operators at less than cost and cited prices in that category from the comparative statement filed by Mr. List.

As a general proposition, the witness explained in the foregoing connection, non-coal roads have no regard for operators or their costs; with such roads it is a question of the lowest price at which they can buy the coal. He denied, however, that the C. & O., in fixing its contract prices, considered any losses incurred by the operators in such sales to other roads.

The cost of production at the C. & O.'s mines, it next developed, is approximately $1.43 a ton. The mines are not now operated to capacity, Mr. Whitaker explained, because the C. & O. does not think it would be fair to operate its mines to an extent greater than other operators are able to do. He denied that the road placed orders through agencies in order to influence traffic routing.

Richmond, Fredericksburg & Potomac

The presentation of the Richmond, Fredericksburg & Potomac was directed by W. D. Duke, general manager, who appeared also as one of its witnesses. C. Delaney Martin, fuel purchasing agent with headquarters at Cincinnati, Ohio, outlined the coal buying policies of the road. He stated that he is employed exclusively by the R. F. & P. and located in Cincinnati because that city is geographically a coal center. The R. F. & P., Mr. Martin continued, selects its fuel from districts supplying the desired quality and giving lowest transport costs to destination. His purchasing activities have never been influenced by either the operating or traffic department; reciprocity has never been a factor and the R. F. & P. has "no fear nor favor" with respect to any operator. In other words, Mr. Martin explained, coal suitable to the mechanical department is bought at the lowest possible price without any other considerations.

Under cross-examination by Mr. List, Mr. Martin said that the R. F. & P. has in the past entered fuel contracts but generally it prefers to buy currently; the experience of the witness is that the latter policy gives the railroad better prices. Also the R. F. & P. knows from experience where it can get suitable coal and which operators will ship in accordance with instructions. A month's supply is stored on the road and when the market is not suited to additional purchases these storage stocks are liquidated. The price per ton, f.o.b. mines, of coal bought by the R. F. & P. has averaged less than a dollar since 1928 and this year is considerably less, some having been bought for as little as 60 cents.

Asked why the R. F. & P. had obtained lower spot prices than other railroads, Mr. Martin replied, "We buy our coal on the R. F. & P.—we shop for it the same as we would buy an overcoat or a horse." It was his idea that the word "buy" means more than parceling out orders. This witness could not see why the R. F. & P. should pay higher prices out of sympathy for the operators since the latter, when the cards were in their favor, "had no hesitancy in dealing themselves a good hand." He recalled paying as high as $8 a ton in 1920 when the operators "didn't hesitate to charge

it." Mr. Duke testified that the R. F. & P. handles but little coal traffic, since the coal roads in that region have their own routes into Potomac Yard.

Seaboard Air Line

Witnesses for the Seaboard Air Line were J. L. Brown, assistant to purchasing agent, J. C. Wroton, general superintendent of transportation, and J. R. Bissett, mechanical inspector. Mr. Brown stated that the Seaboard has no coal mines on its lines; because of its location it is largely limited to the Virginia, West Virginia, Alabama and Tennessee fields in the selection of its fuel. It has fuel inspectors located in these territories. The Seaboard, he explained, awards coal contracts on the basis of competitive bids, placing orders so that the delivered cost of the fuel will be lowest. Its coal year begins July 1 and during 1929-30 it paid an average price at the mines of $1.33 a ton; in 1930-31, $1.34 and for the first three months of the 1931-32 period, $1.29. Respective average prices with foreign freight charges added were $2.71, $2.52 and $2.41.

In outlining the Seaboard's fuel distributing plan Mr. Wroton explained that the company coal movement is southbound whereas the preponderance of commercial traffic is northbound. It is therefore usually possible to fill out tonnage of southbound revenue trains with company fuel. Distribution practices in 1930-31 were not, he explained, entirely representative because during that period the Seaboard liquidated stocks of coal it had in storage. Billings of company coal are arranged so as to give the Seaboard the most favorable rate division; any back hauling of coal to unloading points is negligible, Mr. Wroton added.

It developed in the cross-examination of Mr. Brown that the Seaboard has been making fuel contracts for years; it has never bought spot coal except in emergencies. Its contracts contain a clause requiring operators to give the S. A. L. the benefit of any lower price at which the same coal is sold to other railroads.

Initial cross-examination of Mr. Wroton related to differences shown in an S. A. L. exhibit in the cost of coal delivered at Jacksonville. The witness explained that the costs shown included the price paid the mines plus foreign freight charges, plus the cost of handling on the Seaboard. The latter he said is variable; a figure of 3.6 mills per ton-mile was used for the purpose of the exhibit cited. This 3.6 mills was the average cost to the Seaboard of handling all commodities in 1930. In actual practice, however, Mr. Wroton explained, the set-up of regular revenue trains must be considered in determining the most economical means of handling a specific consignment of company fuel. Thus, for example, a car which moved a greater mileage in a regular revenue train might on the 3.6 mills basis show a higher delivered cost at Jacksonville than one which moved a shorter distance even though the latter was a special movement and as such more costly. In other words, the witness explained, the hauling of company fuel in regular trains which, prior to the addition of the coal cars were short of their rated tonnage is analogous to carrying "deadheads" on regular passenger trains. A fair average cost of storage he gave as 35 or 40 cents a ton including unloading from cars into storage and subsequent removal from stocks for use.

Norfolk Southern

The Norfolk Southern, the final road to appear at Norfolk, presented the testimony of its purchasing agent, L. M. Jones. This road, Mr. Jones said, has ascertained that a high grade mine-run high-volatile coal is best suited to its requirements. There is only one coal mine located on the Norfolk Southern; it produces the desirable type of coal and it has been the policy of the N. S. to take the entire output of this mine which is owned by the Carolina Coal & Byproducts Company. The latter is not in any way affiliated with the railroad although the N. S. holds some second mortgage bonds of the Carolina. Whatever coal was needed in addition to that supplied by the Carolina has been purchased from off-line mines on the basis of competitive bids.

The Norfolk Southern coal year begins July 1; during 1930-31 it paid $1.15 a ton for coal purchased from mines on the C. & O. and N. & W., and $1.25 a ton for that bought on the Carolina, Clinchfield & Ohio. To the Carolina Coal & Byproducts Company it paid in the same year $3.28 a ton. Mr. Jones explained that the Carolina by agreement is paid the average price at which the Atlantic Coast Line, the Seaboard Air Line, the Southern and the Norfolk Southern buy coal in the Virginia and West Virginia districts plus the amount the foreign freight charges would be to N. S. junctions if the coal purchased from the Carolina had been bought in those off-line districts. To the price thus fixed there is added seven mills per ton-mile for the distance that the on-line haul from Carolina mines to unloading points is less than the distance from junction points to the same unloading points would be if the coal originated on a foreign line. If the haul from Carolina mines to unloading points is greater than the junction point-unloading point distance, then the Carolina pays the N. S. seven mills a ton-mile for the difference in haul. The seven mills taken by the N. S. to be the cost of hauling its coal is based on the ruling of the I. C. C. that such a figure may be used in the "Transportation for Investment—Credit" account, Mr. Jones explained.

The witness later stated that the Carolina Company suspended operations in February of this year following an explosion at their mines which resulted in 52 deaths. He further explained that even with the above-mentioned price adjustments the Carolina, in his opinion, had been selling coal to the N. S. below the cost of production; its mines were expensive operations, the company was "too poor to be economical," he added. In response to a final question from Attorney List, Mr. Jones said that the N. S. attempts to divide its off-line purchases equally as between fields on its connecting lines.

At the close of the Norfolk session Mr. List introduced as an exhibit an analysis, prepared by the U. S. bureau of mines, of coal in the West Virginia district. In this connection the record was left open to permit examination by respondents of a bureau of mines officer at a later hearing in Washington, D. C. Examiner Berry announced, however, that such a witness will be called only if his testimony is requested by respondents.

THE STEAMER "SANDY HOOK" of the Central of New Jersey, which had been in service in New York Harbor for over 40 years, was destroyed by fire at Jersey City, N. J. on the night of October 28.

MORE THAN 2,250 PERSONS attended the land leveling and irrigation demonstrations which were conducted in 10 Montana communities by the Agricultural Development department of the Northern Pacific in August and September. The project, which utilized special cars to convey irrigation machinery from point to point, was sponsored by the Montana State College and the development department of the railroad. The demonstrations were designed to focus attention upon the need for land leveling, ways of conserving plant food and means of reducing losses resulting from excessive application of water, and other wasteful practices.

Chicago Great Western Elects Joyce as President

C. A. McCulloch also made a director and A. W. Cutten a member of the Executive Committee

THE directors of the Chicago Great Western, on November 1, elected Patrick H. Joyce, president; Charles A. McCulloch, president of the Parmalee Company, a director; and Arthur W. Cutten, a director of the railroad, a member of the Executive Committee. The selection of Mr. Joyce for president is a recognition of the constructive attention that he has given to this railroad since he first became associated with it on April 2, 1929, as a director. On April 8, 1930, he was elected chairman of the Executive committee and since July 9, 1931, when Victor V. Boatner resigned as president, Mr. Joyce has also served as acting president.

Patrick H. Joyce

Mr. Joyce's initial connection with the Chicago Great Western in 1929 marked a change in the control of that property. Of the 600,000 shares of preferred and common stock represented in person or by proxy at the meeting of the directors on April 8, 1930, the great majority was controlled by Mr. Joyce, John W. O'Leary, who at that time was elected chairman of the board, and their associates. This new interest in the affairs of the Great Western has been reflected in the rehabilitation of the properties and increased aggressiveness in traffic and operating control. A recent activity looking to the future was the purchase from the Allegheny Corporation of a 20 per cent stock interest in the Kansas City Southern.

Since Mr. Joyce and his associates assumed control of the Chicago Great Western, the road has made unusual progress in developing traffic and in reducing costs of operation. The total tons of all freight carried increased from 8,640,985 in 1928 to 9,090,789 in 1929 and declined only to 8,318,244 in 1930, a decline considerably less pronounced than that of other roads in its territory. Expressed in other terms, railway operating revenues amounted to $24,871,023 in 1928 and $25,825,336 in 1929, declining to $22,830,320 in 1930. In the same period, railway operating expenses amounted to $19,426,521 in 1928, $19,867,072 in 1929 and $16,580,398 in 1930, leaving net income after expenses of $907,811 in 1928, of $1,235,879 in 1929 and of $1,309,205 during 1930.

During the past two years the company has made extensive expenditures for the rehabilitation of the properties, including the purchase of 36 locomotives of the 2-10-4 type to replace 29 locomotives which were retired, while other locomotives were improved and rebuilt. Other equipment purchased includes 2 baggage and mail cars, 200 box cars, 300 automobile cars and 6 caboose cars. The purchase of larger locomotives has been accompanied by the rebuilding of 40 bridges and the reinforcing of 6 others, together with the strengthening of the track by the laying of heavier rails, the installation of additional ties, etc.

An outstanding policy of Mr. Joyce and his associates in the operation of the Great Western has been to identify the railroad more closely with the people in the territory which it serves. In addition to developing new contacts, meetings of the board of directors, which formerly were held in New York, are now held at various points along the line.

Among other properties in which the Great Western has an interest and which now come under the direction of Mr. Joyce are the Mason City & Ft. Dodge Railroad Co. and the Leavenworth Terminal Railway & Bridge Co., whose entire stock is owned by the Chicago Great Western. In addition, the Independent Elevator Company, the Iowa Townsite Company, the Great Western Coal Company and the Iowa Development Company are controlled through ownership of stock. To insure necessary terminal facilities for its passenger and freight business, the railway also owns an interest in the Minnesota Transfer Railway Company, the Kansas City Terminal Railway Company, the St. Paul Union Depot Company, the St. Joseph Union Depot Company and the Iowa Transfer Company.

Mr. Joyce, a native of Chicago, has spent his entire life in railway and railway supply service. After some time as a trainman, he entered the supply field, participating in 1918 in the organization of the Liberty Car & Equipment Co., of which company he was elected president. In the following year the Liberty Car

Wheel Company at Hammond, Ind. was organized with Mr. Joyce as president, and when that company merged with the Illinois Car & Manufacturing Co. at Hammond in 1921, he became president of the combined companies, which companies retained the latter name until 1928, when they were purchased by the Standard Steel Car Company, Mr. Joyce being retained as vice-president. With the organization of the Standard Steel Car Corporation as a Pullman subsidiary early in 1930, Mr. Joyce became president of the new company, which position he still holds.

Terminal Practices Hearings at Detroit and Cincinnati

THE hearing of the Interstate Commerce Commission at Detroit, Mich., in Ex Parte 104—Practices Affecting Operating Revenues and Expenses—was concluded on October 29. As reported in the *Railway Age* of October 31, the hearing opened on Oct. 26, and the first roads to present testimony were the Ann Arbor, the Detroit & Mackinac, the Detroit & Toledo Shore Line, the Detroit Terminal, and the Grand Trunk Western.

Witnesses for the Pere Marquette, the next railway to be represented, told the commission—represented by C. M. Bardwell, examiner—about the terminal practices of the railway from a traffic and operating standpoint. R. P. Patterson, freight traffic manager, said that the absorption of switching charges is general, the standard reciprocal switching rate being $7 per car. He said that a check made some time ago indicated that the Pere Marquette received payments for switching from its connections which about equalled over a period of time the amounts it paid in switching charges to its connections. Consequently, the management has felt that the amount of the switching rate is not particularly important in any one instance so long as the Pere Marquette receives for switching which it does as much as it pays for switching done for it.

With respect to the absorption of switching charges, Mr. Patterson said that the railways once restricted such absorption to competitive traffic and made exceptions on certain commodities, but now no exception is made between competitive and non-competitive traffic—largely for the reason that there no longer is such a thing as "non-competitive" traffic. When Attorney Hagerty of the commission asked him why the charge for reciprocal switching should be less than that for industrial switching, Mr. Patterson explained that the reclaim on per diem, paid by the road haul carrier to the switching line in reciprocal switching, adjusts the rate to about the level of that for industrial switching.

A description of switching methods employed at certain larger industrial plants on the Pere Marquette was given by A. E. Badger, general superintendent. At one large plant—to illustrate differences in practices—the Pere Marquette does all switching. At others it does none, while at one it lends a locomotive to the plant, which the plant operates and maintains and which it uses for intra-plant switching. The road makes allowances to shippers in one or two instances. A substantial part of his testimony was devoted to the Detroit Union Produce Terminal, which occupies land owned by a real estate subsidiary of the Pere Marquette, the Pennsylvania and the Wabash and which is served by a railway subsidiary of those roads. Attorney Hagerty exhibited considerable interest in this situation, and counsel for the Pere Marquette agreed to furnish for the record certain information which his witnesses could not supply.

E. H. DeBoard, traffic manager of the Detroit, Toledo & Ironton, testified for that road that some of the industries which it serves take care of their own switching, adding that the D. T. & I. gives no allowances to any of them. In reply to Mr. Hagerty's questions, he said that no distinction is made between competitive and non-competitive traffic in absorbing switching charges on road-haul freight. He said that, in his opinion, it is proper that the reciprocal switching rate should be lower than that for industrial switching. About forty per cent of D. T. & I. traffic is automobile parts, and the next largest commodity handled is coal, Mr. DeBoard said.

Michigan Central

The testimony of Michigan Central witnesses, O. R. Bromley, traffic manager, and H. L. Margetts, superintendent, was in nearly all respects similar to that of the other witnesses. Mr. Margetts said that certain industries on the Michigan Central now have pending applications for allowances on cars which they switch with plant locomotives. In response to a question from Attorney Gwynn, Mr. Margetts described the pooled switching service carried on with the Grand Trunk Western at one point, saying that this is an economical method. The closing Michigan Central testimony was marked by a long argument between counsel regarding the introduction of testimony to show why reciprocal switching charges are less than industrial switching charges. Counsel for the commission finally agreed to keep his questions along this line general in nature, and the taking of testimony continued.

The last road to take the stand at Detroit was the New York, Chicago & St. Louis. Its first witness, W. A. Carley, superintendent of transportation, described switching methods, his testimony being in no way substantially different from that of witnesses of other roads. Asked by Mr. Hagerty why some industries receive allowances while others do not, Mr. Carley replied that there is a different reason in each case. He added that the Nickel Plate effects what it considers to be the most economical arrangement in each instance. The last witness, H. L. Baird, general freight agent, described tariffs covering switching operations at various points on the Nickel Plate system.

Hearings at Cincinnati

The hearings were reopened by the taking of testimony from representatives of railroads operating south of the Ohio river at a session which opened at the Gibson Hotel, Cincinnati, Ohio, beginning November 2, with Examiner C. W. Bardwell presiding.

The first witness called was C. L. Mitchell, assistant general superintendent, Lines West, Southern Railway System, who was asked by counsel to define the termini of the lines operating in the district over which his jurisdiction extended—the Alabama Great Southern and the Cincinnati, New Orleans & Texas Pacific. Mr. Mitchell described in detail the terminal services rendered at various points on the lines and the time required by the switching crews to render such service. He offered exhibits and testimony concerning his company's services at important centers, such as Cincinnati, Ohio, Lexington, Ky., Chattanooga, Tenn., and Birmingham, Ala., and in each case was questioned by I. C. C.

attorney A. C. Hagerty along similar lines with the idea of placing on record the replies to such questions as: (1) What industries on the witness's lines perform their own spotting services? (2) Why do they perform their own spotting services? (3) Do you know any reasons why the railroad could not perform such services for them? (4) Are allowances made to any industries for performing spotting services? (5) Do you assign power to any industrial plant for its exclusive use? (6) Do you lease locomotives to any industrial plant for its exclusive use? (7) Did any industry, at any time, apply for switching service and not receive it? (8) Did any industry, not now receiving one, at any time, ask for an allowance for switching?

Attorney Hagerty received negative replies to these questions in their application to practically all points in Mr. Mitchell's territory, with the exception of Birmingham where a group of eleven industries of varying sizes perform their own intra-plant switching. These cases were described in detail with the reasons applying thereto.

Mr. Mitchell read into the record detail cost figures on terminal switching in response to a request on the part of the commission for such data. The figures, based on test studies made at Birmingham and Chattanooga, showed the cost per switch locomotive-day (eight hours) to be $83.68 for a six-wheel switcher and $88.78 for an eight-wheel switcher. These figures included running, but not general, repair costs. Relating these costs to units of traffic, the cost varied from $2.45 to $3.05 per car, counting the handling of both loads and empties. It was explained that these costs are based only on industrial plant switching, not yard switching.

Mr. Mitchell was questioned at length by J. S. Burchmore, representing the National Industrial Traffic League, as to the basis of determining some of the items in the cost statements, and this led to the calling of R. F. Watts and J. W. Whitaker to the stand. These witnesses—superintendents, respectively, of the Birmingham and Chattanooga terminals—cleared up some of the points raised by Mr. Burchmore, but brought out the fact that the methods used in arriving at the switching costs at the two terminals differed in some details. Questioned by Attorneys Hagerty and R. A. Gwynn, for the commission, these two witnesses expressed the opinion that the costs were representative under present-day reduced operation and, considering that no general expenses or investment charges were included, the figures were low rather than high.

Traffic Representative's Testimony

G. H. Kerr, freight traffic manager, Southern Railway System, at Cincinnati, presented tariff references and rules covering switching charges, reconsignment and storage on the C. N. O. & T. P. and the A. G. S. and explained, in response to a question from Attorney Hagerty, that the Southern absorbs connecting-line switching charges on competitive traffic, but not on non-competitive. Mr. Kerr said that switching charges in the Cincinnati Terminal district are reciprocal, usually $3.60 or $4.95 a car. These charges, he said, are out-of-pocket costs only. He also said that in some cases the costs are as low as $1.35 a car and, when asked by Attorney Hagerty why they are not higher, offered the explanation that the present costs are based in most cases on reciprocal arrangements with other carriers and not on a compensatory basis and that the charges are the result of long-standing assignments. Mr. Kerr suggested that a "cost-plus" basis of arriving at switching charges would be more equitable.

William H. Truesdale, D. L. & W. Chairman, Retires

WILLIAM H. TRUESDALE, who has been chairman of the board of managers of the Delaware, Lackawanna & Western since 1925 when he relinquished the presidency, retired on Nov. 1 after more than 30 years' service as a Lackawanna executive. With Mr. Truesdale's retirement the position of chairman of the board of managers has been abolished.

Mr. Truesdale went to the Lackawanna in 1899 as its president and during the quarter century of his term in that office he directed a program of traffic development and capital improvements which placed the D. L. & W. in the forefront among carriers in eastern trunk-line territory. In commenting upon his retirement from the presidency, the *Railway Age* of June 13, 1925, said "There has been scarcely a year

William H. Truesdale

in Mr. Truesdale's incumbency as president when some major scheme for improvement has not been actively mooted or actually under way."

Mr. Truesdale was born on December 1, 1851, at Poland, Ohio, and was educated in the common schools at Rock Island, Ill. In 1869 he began his railroad career with the Rockford, Rock Island & St. Louis (now a part of the Chicago, Burlington & Quincy) as a clerk in the auditing department. Later he served as cashier, and still later as purchasing agent for the same road. In 1872 and 1873 he was in Frankfort, Germany, as transfer agent for the company, and in the following year returned again to Rock Island as purchasing agent. In 1874 he became connected with the firm of Osborn & Curtis, railroad attorneys, at Rock Island. In 1876 he was appointed assistant to the receiver and treasurer of the Logansport, Crawfordsville & Southwestern (now a part of the Pennsylvania)

at Terre Haute, Ind. Three years later he became general freight agent for the same road, and in 1881, was appointed assistant traffic manager of the Chicago, St. Paul, Minneapolis & Omaha. He became assistant to the president of the Minneapolis & St. Louis in January, 1883, and in May of the same year was elected a vice-president.

In 1887 Mr. Truesdale was advanced to the presidency of the Minneapolis & St. Louis, and the following year was appointed receiver. In 1894, he went to the Chicago, Rock Island & Pacific as third vice-president and general manager. In 1887 he became second vice-president and general manager, and, in 1898, first vice-president and general manager. On March 1, 1899, he was elected president of the Delaware, Lackawanna & Western, with headquarters at New York, and served in that capacity until his election to the chairmanship of the board of directors in June, 1925.

Labor Executives Ask Joint Conference

WASHINGTON, D. C.

AN opportunity to discuss temporary wage reductions on a national scale, as a possible trade for a permanent six-hour day or five-day week, with representatives of all the railroad labor organizations, including some that at present do not have contracts with many of the roads, has been offered to the railway executives. By way of response to the action of the New York Central in opening negotiations with its employees for a temporary wage reduction, and reports that other railroads might take similar action individually, the Railway Labor Executives' Association, at a meeting here on November 2, adopted a resolution declaring the intention of all the organizations represented to act together "to protect and to promote their common interest" and also proposing a joint conference with representatives of the Association of Railway Executives to consider proposals which either side may desire to advance on a national basis.

After stating that proposals affecting railway wages have been made public by several of the railroads and "are known to be under consideration by others," the resolution proposed a joint conferences of representatives of the two associations as to "any proposals affecting railway operation which railway managements desire to advance" and "any proposals, including present and future relief of unemployment and stabilization of unemployment, which this association desires to advance." This left the inference that, provided conferences can be arranged on a national basis, the labor executives might be willing to consider wage reductions in return for an opportunity to get before a committee representative of railway management their proposals for a six-hour day or a five-day week, on which their committees have been working for some time, but which they have so far failed to get before the railroad executives in their efforts to accomplish a joint conference at which this might be taken up in connection with offers of the labor organizations to co-operate with the railroads in urging legislation for the regulation of competing forms of transportation.

A copy of the resolutions was addressed to R. H. Aishton, chairman of the Association of Railway Executives, together with a letter from D. B. Robertson, chairman of the Railway Labor Executives' Association, asking him to undertake to arrange a conference between the "appropriate" representatives of the executives' association and members of the labor executives' association.

Whether the labor leaders were seeking to hold before the railroads the bait of a possible trade of a temporary wage cut for an agreement for a six-hour day or whether they were merely announcing their intention of holding together to resist wage cuts on individual roads by demanding a national conference could not be learned. Mr. Robertson pointed out that the railroads were interested in wage questions while the brotherhoods were interested in the employment question and urged that these questions be considered nationally, saying that the labor leaders were prepared to discuss "any" question the railroads might propose.

Earlier this year the labor executives sought a joint conference with the railway executives to consider the general railroad problem, including the "elimination of unfair competition" and the "stabilization of employment." In reply Mr. Aishton reminded them that the Association of Railway Executives is not authorized to deal with labor matters and that such questions should be handled through the customary channels; that is, primarily, with the individual railroads. He added that he and Alfred P. Thom, general counsel of the Association, had been appointed as a medium of contact with the organizations to facilitate co-operation on any matters within the scope of the association. This letter was later made public by the labor leaders.

The meeting held on November 2 was called primarily to consider a legislative program, including the drafts of proposed bills to be introduced to Congress to provide for a shorter work day or week, compulsory pension legislation, etc. The first day was devoted largely to a discussion of the wage question, however, as precipitated by the action last week of the New York Central. The text of the resolution follows:

Whereas, the economic conditions affecting the operations of and employment on the railroads have changed materially in the current year, and the earnings of railroad employes and the amount of available employment have been reduced severely; and

Whereas, proposals affecting railway wages have been made public by several of the railroads and are known to be under consideration by others; and

Whereas, the employees of all the railroads face the urgent need for the adoption of measures which may provide, not only temporary relief, but assurances of future stabilization of employment and relief from continuing reductions of employment and cyclical periods of grave unemployment; and

Whereas, both the managements of the railroad systems and their employees are organized so that they are able to deal nationally with problems and emergencies affecting the entire transportation industry, and these organizations have a responsibility not only to their memberships, but to the public, to act in concert to work out prompt and adequate solutions of their conflicting interests in order to promote the general welfare and to do all in their power to aid in the restoration of prosperity; therefore.

Be it resolved, that the chairman of this association transmit a copy of this resolution to the Association of Railway Executives and endeavor to arrange a conference between the appropriate representatives of said association and the members of the Railway Labor Executives' Association, for the purpose of considering and recommending to the respective associations action regarding (1) any proposals affecting railway operation which railway managements desire to advance; (2) any proposals, including present and future relief of unemployment and stabilization of employment, which this association desires to advance; and

Be it further resolved that the Railway Labor Executives' Association carry on cooperative action in conformity with the laws of the respective organizations in aid of each and every organization of employees affiliated with this association to protect and to promote their common interest in meeting the needs of the present situation.

Pool Plan Under Consideration

WASHINGTON, D. C.

A PLAN for distributing the proceeds of the temporary emergency rate increase proposed by the Interstate Commerce Commission among the railroads that fail to earn their interest charges, in proportion to their deficiencies, but on a loan basis instead of the "dole" basis apparently contemplated by the commission, is being prepared under the direction of the Advisory Committee of the Association of Railway Executives to be filed with the commission for its approval if subscribed to at a meeting of the member roads. There is no certainty that the plan will be approved by the commission; in fact there are some indications that it will not be, at least without further discussion and hearings, but the plan seems to represent the extent to which the executives are prepared to go in an attempt to comply with the general purpose of the pooling plan suggested by the commission in its decision in Ex Parte No. 103 and in the form in which it is being drafted, it is still to be approved by the Advisory Committee.

The Advisory Committee met here on October 28 and 29 and, after laying down some general policies, left the details of the plan to be worked out by legal, accounting and traffic officers and to be considered at another meeting of the committee. The committee had been instructed at the Atlantic City meeting of the Association the week before to confer with the commission for the purpose of obtaining a more definite understanding of its views and with a view to suggesting certain modifications of some of the commission proposals, and to report back.

J. J. Pelley, W. R. Cole, and H. A. Scandrett, chairmen of the regional committees which represented the railroads in the rate case, and Alfred P. Thom, general counsel of the association, held an inconclusive and rather unsatisfactory conference with the commissioners on October 28 and reported back to the Advisory committee. Apparently they obtained little encouragement for any idea that the commission had intended to leave in its language any choice between a loan and a dole system designed merely to avoid receiverships. It is understood that some of the commissioners were outspokenly hostile to the suggestion of a loan plan, while others gave no indication of their attitude and that, whether or not they had intended doing so, the railway officers refrained from putting before the commission any proposition for the commission to commit itself on until a concrete plan is actually filed.

Neither the commissioners nor the railroad men would discuss the conference afterward and the only information given newspaper men was that no conclusions had been reached but the railroad men did not expect to come back for another conference. Most of the railway executives left Washington on October 29, with the idea of holding another meeting as soon as the draft of the plan is completed, to be followed by a meeting of the member roads.

Because of the anomalous and extra-legal character of the whole scheme many difficulties were encountered in attempting to frame a plan for handling revenue which apparently is not revenue in the ordinary sense. Freight tariffs filed with the commission are supposed to contain rates for transportation, but under the proposed plan they are to provide for rates for transportation plus a temporary surcharge which is to be used to meet deficiencies in net income, often on some far distant road.

While some roads are said to have expressed concern as to whether the revenues thus collected would become taxable income, it is understood that the commisison's idea of its pooling suggestion was that the proceeds of the temporary rate increase should never become the property of the carriers collecting it which are earning their interest charges and about which the commission, therefore, was not worrying. They were to be regarded as mere collecting agencies and trustees, although the commission took the position that even they would be helped to some extent by the plan because even their securities "suffer from the distress of others not so fortunate". The proposed increases without pooling, the report said, "would go, in part, to carriers now securing revenues adequate to sustain their credit, and as to which no emergency exists."

All freight charges permitted by the commission are supposed to be as just and reasonable rates and the commission has held that rates increased 15 per cent would not be reasonable because the traffic would not bear it, but it was held that the traffic will bear the increase it has proposed but that some of the railroads collecting the increased rates may not retain the proceeds of these just and reasonable rates because the emergency does not require it.

The recapture plan of the 1920 law also contemplates that some roads may collect more than they might have been allowed if rates were to be made only for single railroads, instead of by groups, and the Supreme Court has upheld that arrangement, but even the recapture law provides that a company may retain all it earns up to 6 per cent and half of any excess and Congress also provided that the recapture fund should be loaned and not given to weaker roads.

Under the commission's plan a road may lose some traffic to a competing water carrier because of the extra charge of $3 or $6 a car, or 1 or 2 cents per 100 pounds on certain commodities, yet would have to pay into the pool the surcharge collected on what freight it did carry and thus might suffer a net loss.

The commission had pointed out in its report that many difficulties would have to be met in working out the details of the plan, saying that appropriate provision would have to be made to take care of variations in maintenance, depreciation and other operating charges —so that a road might not increase its deficiency to be met from the pool by increasing its maintenance expenditures, and that appropriate provisions should be made as to the accounts of carriers reporting separately but operate as part of a system. This same question as to system accounting arises in the recapture cases but as the commission has not yet decided just what constitutes a system it adds additional complications in this instance. One road having a deficiency under interest charges may be subsidiary to a parent company able to satisfy the deficiency, and apparently, under the commission's idea, would not be entitled to draw from the pool, but there is still the question as to whether the commission will be willing to consider carrier operations alone, or require non-operating income derived from non-carrier sources to be included.

While the railway executives were in Washington discussing Commissioner Eastman's pooling plan as applied to the railroads, Congressman Treadway, of Massachusetts, went so far as to suggest in the newspapers a plan for pooling Congress at the coming session, because the House of Representatives is so evenly divided between Republicans and Democrats.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended October 24 amounted to 769,673 cars, an increase of nearly 8,000 cars as compared with the week before. This, however, was a reduction of 189,819 cars as compared with the corresponding week of last year and of 364,687 cars as compared with 1929. The increase as compared with the week before was largely due to the increase in miscellaneous freight. There were also increases in grain, livestock and coal, offset by reductions in other items.

Revenue Freight Car Loading

Week Ended Saturday, October 24, 1931			
Districts	1931	1930	1929
Eastern	174,871	209,437	245,706
Allegheny	146,039	182,121	226,861
Pocahontas	51,137	57,021	65,858
Southern	109,436	138,338	157,202
Northwestern	97,334	135,522	159,694
Central Western	124,248	157,582	179,965
Southwestern	66,608	79,271	99,084
Total Western Districts	288,190	372,375	438,743
Total All Roads	769,673	959,492	1,134,360
Commodities			
Grain and Grain Products	40,163	41,612	43,013
Live Stock	30,748	35,369	38,772
Coal	152,861	192,181	204,447
Coke	5,733	9,218	12,025
Forest Products	23,963	38,887	62,634
Ore	16,924	36,091	50,228
Misc. L.C.L.	214,715	240,055	270,414
Miscellaneous	284,566	366,079	452,827
October 24	769,673	959,492	1,134,360
October 17	761,719	931,105	1,185,564
October 10	763,864	954,782	1,179,540
October 3	777,837	971,255	1,179,947
September 26	738,029	950,663	1,203,139
Cumulative total, 43 weeks	31,639,081	38,970,335	44,599,437

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended October 24 totaled 61,654 cars, an increase over the previous week of 5,795 cars and a decrease of 6,626 cars from the same week last year.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
October 24, 1931	61,654	23,327
October 17, 1931	55,859	22,665
October 10, 1931	58,171	23,196
October 25, 1930	68,280	32,118
Cumulative Totals for Canada		
October 24, 1931	2,117,878	1,099,194
October 25, 1930	2,653,664	1,435,695
October 26, 1929	2,977,770	1,776,980

Odds and Ends . . .

Another Record?

Engineer H. E. Nichols and Conductor C. H. Cornelius of the Iowa division of the Chicago, Milwaukee, St. Paul & Pacific have worked together on the same train for 47 years.

The Pennsylvania's "Congressional"

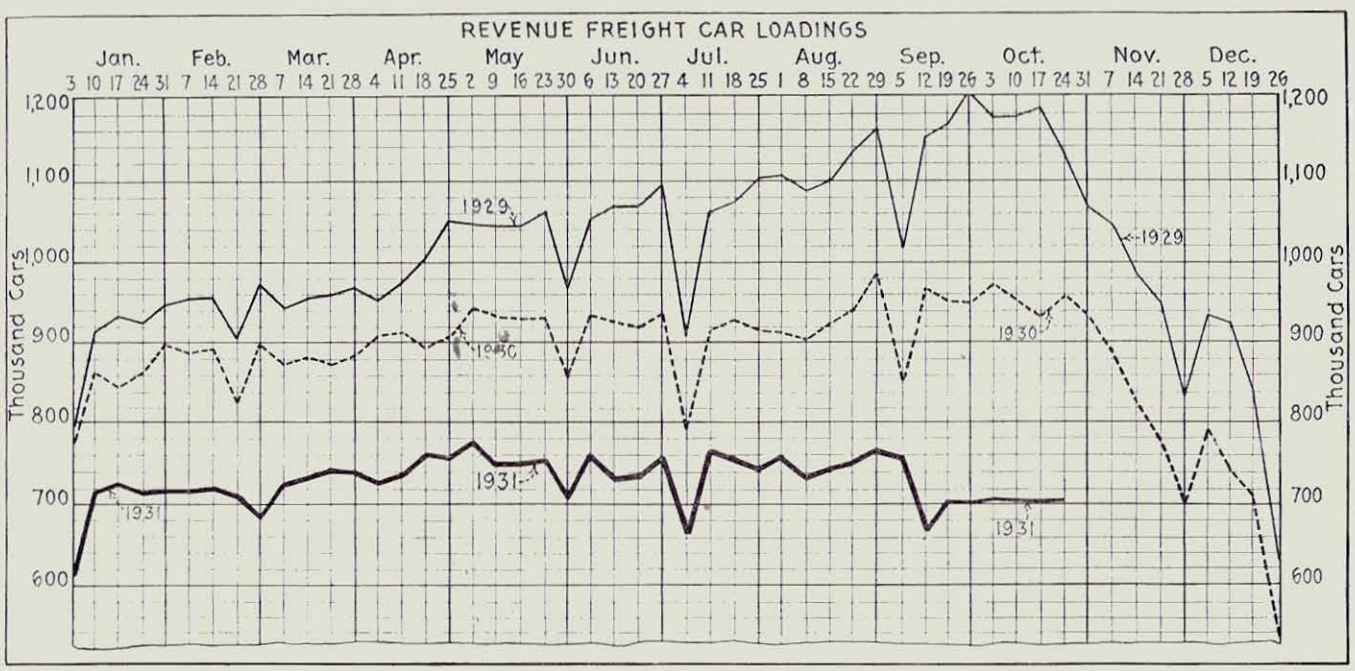
When the Pennsylvania speeded up the schedule of the Congressional Limited, its premier train between New York and Washington, on November 1, advantage of the occasion was taken by the publicity department of the railway to inform the public of some of the history of this famous train. It may very well be true that the Congressional has carried more famous men and women than any other train in the world. The Congressional was established in 1885 at the request of a group of congressmen, who were required to make regular trips between New York and the national capital. It has numbered among its distinguished frequent patrons Presidents Harrison, McKinley, Roosevelt, Taft and Coolidge. The distinction of having occupied the only private car operated on the Congressional fell to the late J. Pierpont Morgan, whose car one day was carried to Washington and back to New York so that the financial magnate might confer with the President on an emergency in international finance.

Transcontinental Trucking

You have doubtless read of the refrigerated truck which recently made an experimental run from Los Angeles to New York, crossing the continent in 12 days. What the results of this experiment mean, if anything, is a matter of conjecture. The California newspapers tell of one enthusiastic individual who seems to be thoroughly sold on transcontinental trucking of perishable freight.

This enthusiast believes that trucks should be used to handle 90 per cent of the perishable shipments from California to the nation's markets. Giving free reign to his imagination, he estimates that this could be accomplished by 50,000 refrigerated trucks, each costing about $8,000. This would mean $400,000,000 to the manufacturers of trucks, the employment of an army of men, a greater demand for gasoline, and the employment of another army of workers to keep the highways in repair. Ultimately, he says, this would require the building of new heavy highways to be used exclusively by trucks.

All those in favor say, "Aye."



NEWS

Colpitts Presents Transport Program

Noted engineer and transport expert outlines eleven definite objectives

W. W. Colpitts, a member of the consulting engineering firm of Coverdale & Colpitts, New York, in an address at a joint meeting of the Birmingham (Ala.) Traffic and Transportation Club and the Engineers Club of that city, outlined recently eleven definite corrective measures to be undertaken to improve transportation conditions. The first step recommended was emergency increases in freight rates and the second was a reduction in wages and salaries. These he advocated for immediate relief. Continuing, he outlined his nine other measures as follows:

"Third: The public should be further enlightened upon the whole subject of transportation. It should be fully advised of the fact that both the older and newer transportation agencies competing with the railroads are partially supported by hidden governmental subsidies; that the railroads on the other hand must depend wholly upon their own resources; that the heavy taxes and other costs they pay contribute to the support of their competitors; that there is not now, nor in prospect, any other agency that on even terms can displace the railroads for the movement of the great bulk of the country's traffic, and that high class railroad service is essential to the best interests of the whole people.

"Fourth: The government should withdraw from the transportation business and should not aid one commercial transportation agency, to the detriment of another.

"Fifth: Government improved waterways should be made self-supporting through charges to users to cover interest, maintenance, depreciation and amortization.

"Sixth: The various laws restricting the railroads in their legitimate aspirations to provide the cheapest transportation in all its branches, whether on the highways, on the inland waterways, on the Great Lakes, or in competition with the Panama Canal route, should be repealed or modified.

"Seventh: The common carrier regulatory laws should be modified in many particulars to permit greater freedom of action on the part of railroad managements.

"Eighth: All transportation agencies carrying traffic for hire should be placed on a basis of equality, subject to the same character of regulation and under one control, the Interstate Commerce Commission, allowing economic laws to function freely in the case of each.

"Ninth: The railroads should be relieved of a large part of the cost of separating grades at existing highway crossings and of building new highways or crossings. They should not be obliged through taxation to defray any part of the cost of building or maintaining any structure or waterway, the necessity for which is to provide facilities for the use of their competitors.

"Tenth: The Interstate Commerce Commission, or some other equally competent and unbiased body, should initiate a comprehensive study of the whole commercial transportation question with a view of determining the proper economic sphere of each agency and of fixing limitations to avoid unjustifiable competition and duplication of service.

"Eleventh: The Interstate Commerce Commission should exercise its powers under the Transportation Act to raise rates as well as to lower them so as to enable the railroads to earn a fair return.

"While the present situation of the railroads is anything but satisfactory their future prospects, following the return of normal conditions and relief from the onerous restrictions and discriminations which now hamper them, are in fact excellent. The marked improvement in efficiency that has been accomplished during the period of business depression, the elimination of unnecessary services and various other economies will quickly be reflected in larger net earnings. I have no doubt that upon the return of normal conditions the withdrawal of the emergency increase in rates will be justified, and any reductions in salaries and wages that may presently be made can be restored; and the cost of transportation as a whole to the public will be reduced."

Federal Regulation of Refrigerator Car Lines Urged

An opinion that refrigerator car companies should be placed under the jurisdiction of the Interstate Commerce Commission is expressed by Commissioner Eastman of the Interstate Commerce Commission in a letter to Senator Couzens, chairman of the Senate committee on interstate commerce, who had made an inquiry as to the possibility of diversion of railroad revenues to subsidiary companies whose accounts are not within the commission's jurisdiction. He pointed out that any profits diverted to subsidiary corporations come back to the parent companies in the form of dividends but that they affect the amount of the net railway operating income.

Rail Service Rendered With Marked Efficiency

Dr. Klein finds carriers have keen perception of new requirements of business

Facts do not substantiate the view that "the old Iron Horse is losing out rapidly as a carrier of freight—that it is slipping fast and fighting a losing battle," Dr. Julius Klein, assistant secretary of commerce, held in a recent radio address broadcast from Washington, D. C., over the coast-to-coast network of the Columbia Broadcasting System.

"The truth of the matter," Dr. Klein continued, "is that the railways still carry 75 per cent of the freight traffic of the United States, as measured in ton-mileage, whereas it is believed trucks carry only about three per cent —a proportion so small as to be very surprising to most of us. That does not mean that motor transport is of minor consequence. The truck and bus have, and will continue to have, an increasing part as public carriers. Their possibilities, limitations, and relations to rail service are being more and more clearly defined.

"Even though the number of passengers carried by the railways has been decreasing since 1920, and the freight tonnage declined in 1930 as compared with other recent years, by reason of the depression, the railway lines still render a stupendous amount of service to American business, and they are rendering it with mounting efficiency, a keen perception of new requirements, and a resolute adherence to ideals and standards of the highest type.

"There is one extremely important aspect of our railways to which most of us fail to give due attention. When we think of the place that these lines occupy in our business structure, we are apt to consider only the service that they render, the elements of competition, the varied phases of their financing. But another immensely significant factor which ought to be strongly stressed is the market that the railways afford for all kinds of commodities. The railways as buyers form one of the foremost stimulating and sustaining forces in our economic mechanism. Their purchases of fuel, materials, and miscellaneous supplies run the gamut of the productive industries. According to the most careful computation, the Class I railways bought more than a billion dollars' worth of goods essential to their operation in the year 1930. Just

think what that means in terms of busy factories and farms, active mines and lumber yards: in other words, tens of thousands of jobs for workers in practically every field.

"Between half and two-thirds of all the money that the railways earn is unavoidably devoted to fixed charges which cannot be cut down—taxes, interest on their bonds, etc. Such a situation, of course, make matters difficult for the companies when they are hit by a depression like the one we are now combating. The depression cuts down their receipts—they cannot earn so much—so they naturally want to reduce expenditures in something like the same degree. But it is hard for the railways to do that, because so large a proportion of their obligations are 'rigid.' Here, certainly, is one of the formidable, deeply-rooted quandaries in which the companies find themselves.

"It is plain, under such conditions, that they must direct their most vigorous assaults, their most determined efforts, upon those items that do lend themselves to reduction. Such an item is the operating expense. I am omitting wages, which of course present far too delicate and complicated a question for me to analyze fairly in this brief period.

"Right here is where augmented efficiency comes in. And such efficiency has come in with some really resounding triumphs. The railways have been and still are, in the very front rank of American industries and activities as regards the introduction of new methods, improved devices, ingenious shortcuts and in general superior management in the handling of their distinctive engineering problems. In many ways, their achievements along this line have been positively startling.

"I naturally cannot go into the contentious questions of competition between the various agencies of transportation. These questions are enormously complex. They involve endless technicalities. Many strong, valid arguments can be advanced on every point at issue. Most of these problems come within the province of the Interstate Commerce Commission and of the Congress. I cannot undertake even to summarize them within the few minutes of a radio talk.

"What I do want to emphasize is the big salient fact that our American railways today, with very few exceptions, are rendering enormous service to American business and are thoroughly alert, progressive, and 'in tune with the times.' Their future as an indispensable agency of transportation seems to me to be secure."

Club Meetings

The Central Railway Club of Buffalo (N. Y.) will hold its next meeting at Hotel Statler, Buffalo, on Thursday evening, November 12. Frank C. Groom, I. C. C. inspector, will speak on the steam locomotive and its maintenance.

The subject, "Patents and Railway Progress," scheduled to be presented by Charles L. Howard, assistant general counsel, Western Railroad Association, at the October meeting of the Western Railway Club, and unavoidably postponed, as announced in the *Railway Age* issue of September 26, will be presented Monday evening, November 16, at the Hotel Sherman, Chicago.

A.R.E.A. To Hold Two-Day Meeting

The American Railway Engineering Association decided, at a meeting of its board of directors on November 4, to confine its next annual convention to two days, March 15 and 16, with an evening session on the first day and an association luncheon on the second day.

Cotton Rates to New England Reduced

The Interstate Commerce Commission has authorized the Southern Pacific Steamship Line (Morgan Line) and the Mallory Steamship Line to put into effect on five days' notice a reduction in freight rates on compressed cotton from Houston, Galveston, New Orleans and Mobile to Boston and other New England points, to meet the competition of unregulated water lines. Rates ranging from 52 to 67 cents per 100 lb., are reduced to 35 cents.

Truck Tariffs Become Effective

The Interstate Commerce Commission voted on November 4 not to suspend the tariffs filed by the Baltimore & Ohio, Pennsylvania, Central of New Jersey and Delaware, Lackawanna & Western establishing flat rates for the transportation of truck bodies, loaded or empty, between Jersey City, Philadelphia, Baltimore, Richmond, and Scranton, which had been proposed as a means of meeting truck competition on the highways by combining the economy of rail transportation for the road haul with that of the truck for terminal delivery. The commission also voted not to suspend tariffs filed by a number of eastern roads proposing rates for mixed carloads of freight without classification. The truck tariffs became effective on November 5 and later dates.

I.C.C. Accounting Order Upheld

A special United States court of three judges, sitting in the western district of Virginia, on October 16 issued a decision denying an application of the Norfolk & Western for an injunction against an order of the Interstate Commerce Commission which directed the railway company to include its investment in certain coal mines under balance sheet account No. 705, which embraces miscellaneous physical property, instead of under account No. 701, which includes investment in road and equipment. The company had contended that as the mines are operated in connection with its system of transportation the commission's classification of them as non-transportation property was an arbitrary abuse of power on the part of the commission. The net investment involved was $2,650,467, as of 1928, and the amount has been carried in account 705 under the commission's rules. The company had asked to have it transferred to 701, whereupon, after hearings, the commission issued a formal order requiring that it be carried in 705. The property also had been classified as non-carrier in the tentative recapture report. The court held that the matter was within the discretion of the commission unless its exercise of power was shown to be arbitrary and that the classification seemed to it to be entirely reasonable and proper.

Tickets With Two-Cents-a-Mile Options

A new type of commutation ticket affording a low rate to patrons and extending them the option of purchasing additional rides on the same division at a rate of two cents a mile was placed on sale by the Chicago & North Western and the Chicago, North Shore & Milwaukee in the Chicago suburban area on November 2. With the 12-ride weekly ticket, which is priced lower than the standard 10 and 25-ride tickets and only slightly higher than the 60-ride monthly tickets, a patron may purchase additional suburban rides up to 50 per cent of the total mileage represented by the 12 rides on the ticket. The new ticket is designed to appeal to ticket holders who wish to furnish transportation to members and visitors of the family and also to ticket holders who have occasion to travel to points on the division beyond their stations.

R.B.A. Annual Meeting

The twenty-third annual meeting and dinner of the Railway Business Association was held at the Stevens Hotel, Chicago, on November 4. During the morning session resolutions were presented by the general executive committee pertaining to motor coach and truck competition and government in business. At the luncheon Samuel O. Dunn, editor of the *Railway Age*, spoke on manufacturing in railway shops while Frank W. Noxon, secretary of the association spoke on railway business. At the annual dinner the speakers included Colonel Robert Isham Randolph, president of the Chicago Association of Commerce, Paul Shoup, president of the Southern Pacific, whose subject was "Railroads as Spenders," Thomas F. Woodlock, contributing editor of the Wall Street Journal, whose topic was "Ninety-Seven Varieties of Star Spangled Communism" and George E. Vincent, ex-president of the Rockefeller Foundation, whose subject was "As Others See Us."

Roads Should Be Allowed to Accumulate Reserves

The railroads could be made an agency to contribute very largely to a stabilization of industry in general if they were allowed to accumulate in times of prosperity reserves which could be used in times of depression for normal maintenance expenditures, Daniel Willard, president of the Baltimore & Ohio, testified before a subcommittee of the Senate committee on manufacturers which is holding hearings on proposals for a national economic council. Mr. Willard said that when business is good it would seem wise to let the railroads earn a larger

return than the law contemplates so that it would not be necessary to make such drastic reductions in expenditures when business is bad in order to maintain financial integrity. He pointed out, however, that the recapture law proposes to take away from a railroad half of any excess over 6 per cent earned in good times although, as the law has been administered, the railroads as a whole have never been allowed the fair return contemplated by the law. He expressed doubts as to how much could be accomplished by such a national planning body as has been proposed by some witnesses before the committee.

D. B. Robertson, president of the Brotherhood of Locomotive Firemen and Enginemen and chairman of the Railway Labor Executives' Association, testifying before the committee on the following day, advocated the plan for a national economic council. He said that 500,000 railway employees had been thrown out of employment as the result of the depression and 250,000 more through technological developments in the industry and that the outlook is discouraging. He said that many men are now working only part time in order to spread employment and criticized the railway managements for failure to co-operate with the labor organizations on their plan for "stabilizing" employment.

The Canadian Roads in September

The Canadian Pacific reports September earnings at $3,263,692, as compared with $6,750,672 in September of last year. Although the company was able to effect the substantial cut in operating expenses of $3,915,321, the drop in gross totaled $7,402,301, resulting in the reduced net as noted. Gross was $12,210,415, against $19,612,717 in the corresponding month of 1930.

For the nine elapsed months of this year, gross revenues were $105,914,607, a reduction of $30,066,713, while expenses were reduced by $21,842,956, resulting in net for that period being $14,660,241, or a decline of $8,223,757 from the net of that period of 1930.

The following statement shows gross revenues, expenses and operating net for the month of September and for the nine months of the fiscal year ended with September:

	SEPTEMBER 1931	1930	Decr.
	$	$	$
Gross	12,210,415	19,612,717	7,402,301
Exp.	8,946,723	12,862,045	3,915,321
Net	3,263,692	6,750,672	3,486,980
	NINE MONTHS 1931	1930	Decr.
	$	$	$
Gross	105,914,607	135,981,321	30,966,713
Exp.	91,254,365	113,097,322	21,842,956
Net	14,660,241	22,883,999	8,223,757

Net operating revenue for the month of September, 1931, of $1,387,981, is shown by the monthly statement of gross revenues, operating expenses and net revenues of the Canadian National. Operating expenses show a decrease of $3,183,371 as compared with those of September, 1930.

Gross revenues in September, 1931, were $15,159,905, a decrease of $5,697,043 as compared with the corresponding month of 1930. Operating expenses for September, 1931, were $13,772,823 a decrease of $3,183,371 as compared with September, 1930, while net revenue for last month was $1,387,081, a decrease of $2,513,671 as compared with September of last year.

For the period from January 1 to the end of September, 1931, gross revenues were $132,552,815, a decrease of $36,433,353 as compared with the corresponding period of 1930. Operating expenses for the 1931 period were $128,987,044, a decrease of $20,154,262 from the expenses of the similar period of 1930. Net revenue for the nine months of 1931 was $3,565,770, a decrease of $16,279,091 compared with the same period of 1930.

Net Return for Nine Months 2.08 Per Cent

Class I railroads for the first nine months of 1931 had a net railway operating income of $407,660,068, which was at the annual rate of return of 2.08 per cent on their property investment, according to reports compiled by the Bureau of Railway Economics. In the first nine months of 1930, their net was $660,901,036, or 3.44 per cent. Operating revenues for the nine months totaled $3,279,306,284, compared with $4,083,333,088 for the same period in 1930, a decrease of 19.7 per cent. Operating expenses amounted to $2,524,542,897, a decrease of 17.3 per cent.

Class I railroads in the first nine months of 1931 paid $246,523,011 in taxes, compared with $275,483,810 for the same period in 1930, a decrease of 10.5 per cent. For September, the tax bill amounted to $26,369,160, a decrease of $5,296,945 under September of the previous year.

Thirty-six Class I railroads operated at a loss in the first nine months, of which 12 were in the Eastern district, 7 in the Southern and 17 in the Western.

For September the roads had a net of $55,318,586, which, for that month, was at the rate of 1.76 per cent. In September, 1930, their net was $104,434,777, or 3.39 per cent.

Operating revenues for September amounted to $350,334,575, compared with $467,537,182 in September, 1930, a decrease of 25.1 per cent. Operating expenses totaled $258,222,616, a decrease of 19.3 per cent.

Class I railroads in the Eastern district for nine months had a net of $213,762,440, at the rate of 2.30 per cent. For the same period in 1930, their net was $348,887,642, or 3.86 per cent. Operating revenues in the Eastern district for the nine months totaled $1,640,922,892, a decrease of 19.7 per cent below those of the corresponding period the year before, while operating expenses totaled $1,260,902,248, a decrease of 16.9 per cent. For September they had a net of $26,022,023, compared with $44,368,892 in September, 1930.

Class I railroads in the Southern district for nine months had a net of $33,884,257, which was at the rate of 1.38 per cent. For the same period in 1930, their net was $63,354,619, at the rate of 2.60 per cent. Operating revenues for the nine months amounted to $403,116,132, a decrease of 18.2 per cent under the same period in 1930, while operating expenses totaled $330,500,327, a decrease of 15.1 per cent. Class I railroads in the Southern district for the month of September had a net of $2,123,576, compared with $8,861,972 in September, 1930.

In the Western district for nine months the net was $160,013,371, at the rate of 2.04 per cent. For the same nine months in 1930, the railroads in that district had a net of $248,658,775, at the rate of 3.21 per cent. Operating revenues for the nine months amounted to $1,235,267,260, a decrease of 20.2 per cent, while operating expenses totaled $933,140,322, a decrease of 18.6 per cent. For September, the net in the Western district amounted to $27,172,987. The net of the same roads in September, 1930, totaled $51,203,913.

CLASS I RAILROADS—UNITED STATES

	MONTH OF SEPTEMBER 1931	1930
Total operating revenues	$350,334,575	$467,537,132
Total operating expenses	258,222,616	320,155,425
Taxes	26,369,160	31,666,105
Net railway operating income	55,318,586	104,434,777
Operating ratio—per cent	73.71	68.48
Rate of return on property investm't	1.76%	3.39%
	NINE MONTHS ENDED SEPTEMBER 30	
Total operating revenues	$3,279,306,284	$4,083,333,088
Total operating expenses	2,524,542,897	3,052,972,873
Taxes	246,523,011	275,483,810
Net railway operating income	407,660,068	660,901,036
Operating ratio—per cent	76.98	74.77
Rate of return on property investm't	2.08%	3.44%

Meetings & Conventions

The following list gives names of secretaries, date of next or regular meetings and places of meetings.

AIR BRAKE ASSOCIATION—T. L. Burton, Room 5605, Grand Central Terminal Building, New York City.

ALLIED RAILWAY SUPPLY ASSOCIATION.—F. W. Venton, Crane Company, 836 S. Michigan Blvd., Chicago. To meet with Air Brake Association, Car Department Officers Association, International Railroad Master Blacksmiths' Association, International Railway Fuel Association, International Railway General Foremen's Association, Master Boiler Makers Association and the Traveling Engineers' Association.

AMERICAN ASSOCIATION OF FREIGHT TRAFFIC OFFICERS.—W. R. Curtis, F. T. R., M. & O. R. R., Chicago, Ill. Annual meeting, November 19, 1931, Waldorf Astoria Hotel, New York City.

AMERICAN ASSOCIATION OF GENERAL BAGGAGE AGENTS.—E. L. Duncan, 332 S. Michigan Ave., Chicago.

AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J. 143 Liberty St., New York.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—F. O. Whiteman, Room 800, 1017 Olive St., St. Louis, Mo. Next meeting, 1932, Detroit, Mich.

AMERICAN ASSOCIATION OF SUPERINTENDENTS OF DINING CARS.—F. R. Borger, C. I. & L. R. R., 836 Federal St., Chicago.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—Guy C. Hecker, 292 Madison Ave., New York.

AMERICAN RAILWAY ASSOCIATION.—H. J. Forster, 30 Vesey St., New York, N. Y.
Division I.—Operating.—J. C. Caviston, 30 Vesey St., New York, N. Y.
Freight Station Section. — R. O. Wells, Freight Agent, Illinois Central Railroad. Chicago.
Medical and Surgical Section.—J. C. Caviston, 30 Vesey St., New York.

(Continued on page 728)

Revenues and Expenses of Railways

MONTH OF SEPTEMBER AND NINE MONTHS OF CALENDAR YEAR 1931

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1930.
Akron, Canton & Youngstown	Sept.	171	$145,933	$71	$153,036	$24,041	$15,751	$10,229	$48,590	$15,996	$114,607	74.9	$38,429	$26,218	$12,827	$59,784
	9 mos.	171	1,427,254	673	1,498,284	202,152	151,536	105,618	457,721	120,608	1,036,982	69.2	461,302	348,682	217,152	429,927
Alton	Sept.	1,028	1,122,802	246,385	1,537,655	230,548	216,038	70,764	624,679	51,918	1,207,651	78.5	330,004	346,029	222,656	—1,212
	9 mos.	1,028	10,695,391	2,473,456	14,680,244	1,778,132	2,844,620	635,226	5,902,916	530,175	11,793,404	80.3	2,886,840	1,963,028	594,117	431,458
Alton & Southern	Sept.	30	.....	.....	89,068	4,682	7,379	5,173	31,513	4,831	53,578	60.15	35,490	25,282	20,642	29,721
	9 mos.	30	.....	.....	828,413	80,703	66,057	45,883	304,628	45,546	542,817	65.52	285,596	199,242	182,309	219,453
Atchison, Topeka & Santa Fe	Sept.	9,669	9,867,205	1,593,455	12,445,421	1,274,491	2,660,507	350,464	3,751,144	400,911	8,435,265	67.6	4,030,156	2,735,810	2,842,145	4,989,582
	9 mos.	9,661	89,413,191	16,754,414	116,232,329	15,702,363	25,279,047	3,523,095	36,370,873	3,844,535	84,518,074	72.7	31,714,255	20,785,275	20,974,896	26,415,779
Gulf, Colorado & Santa Fe	Sept.	1,976	1,204,515	71,655	1,368,219	191,548	285,730	53,421	500,735	71,584	1,088,295	79.5	280,014	181,387	108,044	792,371
	9 mos.	1,976	12,585,069	783,936	14,242,434	2,247,332	3,114,097	509,200	4,886,116	729,843	11,446,151	80.4	2,796,283	1,917,296	969,604	2,466,298
Panhandle & Santa Fe	Sept.	1,876	808,596	62,628	931,435	112,401	190,704	18,595	271,337	34,366	620,770	66.6	310,665	256,822	154,761	388,003
	9 mos.	1,808	7,969,645	569,282	9,135,423	1,401,616	1,909,220	180,115	2,700,385	333,056	6,492,027	71.1	2,643,396	2,148,561	1,196,272	1,496,171
Atlanta & West Point	Sept.	93	104,258	25,426	149,903	24,316	30,798	9,496	60,603	12,165	141,422	94.3	8,481	—3,004	—15,081	—5,993
	9 mos.	93	983,500	258,827	1,442,561	198,931	280,769	92,899	589,738	106,439	1,302,367	90.3	139,994	35,527	—54,158	29,111
Western of Alabama	Sept.	133	110,023	28,053	153,523	22,730	39,077	10,419	56,930	10,594	143,314	93.4	10,209	972	5,646	43,428
	9 mos.	133	1,039,532	275,560	1,473,405	215,976	356,947	99,156	555,172	106,525	1,363,830	92.6	109,575	9,633	63,065	244,379
Atlanta, Birmingham & Coast	Sept.	639	214,201	9,140	251,202	65,212	58,236	23,383	116,512	19,079	291,201	115.9	—39,999	—55,880	—64,276	—22,654
	9 mos.	639	2,244,859	96,776	2,618,065	630,101	636,422	236,991	1,235,592	174,625	2,998,253	114.5	—380,168	—524,373	—687,272	—448,579
Atlantic Coast Line	Sept.	5,153	2,304,987	304,319	2,949,079	653,931	861,823	136,032	1,416,670	160,289	3,249,363	110.2	—300,284	—600,866	—508,351	170,855
	9 mos.	5,161	33,049,254	6,403,539	43,505,849	6,272,077	8,437,677	1,325,708	15,705,440	1,542,956	33,677,937	77.4	9,827,912	5,773,498	4,567,226	5,714,395
Charleston & Western Carolina	Sept.	342	163,365	3,903	174,263	31,221	30,444	7,076	68,384	6,745	143,831	82.5	30,432	12,898	12,348	25,098
	9 mos.	342	1,847,737	42,570	1,955,591	317,261	268,000	65,184	709,519	57,945	1,415,648	72.4	539,943	360,886	325,351	193,528
Baltimore & Ohio	Sept.	5,653	11,369,998	1,250,108	13,642,698	1,104,761	2,275,248	462,420	4,551,459	632,066	9,173,578	67.2	4,469,120	3,822,978	3,517,413	4,475,672
	9 mos.	5,653	102,914,037	11,636,500	123,438,205	10,889,928	25,600,788	4,564,307	45,634,367	5,907,850	93,969,603	76.1	29,468,602	22,697,565	20,216,719	30,320,832
Baltimore & Ohio Chic. Term	Sept.	85	.....	.....	294,040	39,464	56,444	2,060	175,439	17,509	295,491	100.5	—1,451	—53,860	2,687	135,727
	9 mos.	85	.....	.....	2,484,276	299,065	327,858	20,341	1,302,166	163,714	2,162,219	87.0	322,057	—113,372	641,627	903,609
Staten Island Rapid Transit	Sept.	23	57,643	116,845	184,276	8,218	13,443	1,925	89,015	19,554	132,155	71.7	52,121	35,021	21,907	26,127
	9 mos.	23	504,207	1,071,897	1,658,883	114,591	125,484	18,349	822,461	156,436	1,237,321	74.6	421,562	265,162	142,461	251,624
Bangor & Aroostook	Sept.	619	362,507	21,033	408,864	101,438	97,660	5,162	119,162	28,113	353,640	86.5	55,224	17,348	27,739	181,347
	9 mos.	619	4,573,957	324,549	5,133,693	1,067,834	1,036,605	51,118	1,317,484	252,516	3,744,819	72.9	1,388,874	952,260	963,764	1,796,366
Belt Ry. Co. of Chicago	Sept.	53	.....	.....	428,193	33,059	52,163	3,299	213,269	9,975	311,765	72.8	116,428	41,005	70,137	148,804
	9 mos.	53	.....	.....	4,058,021	255,893	409,887	31,714	1,940,747	89,215	2,727,456	67.2	1,330,565	701,065	995,663	1,370,298
Bessemer & Lake Erie	Sept.	226	953,905	2,534	966,061	121,112	168,048	11,905	211,042	36,290	547,697	56.7	418,364	354,834	342,102	773,302
	9 mos.	227	7,030,832	22,575	7,160,302	974,569	1,864,627	120,118	1,885,232	335,002	5,191,113	72.5	1,969,189	1,569,963	1,568,554	4,037,007
Boston & Maine	Sept.	2,089	3,024,173	962,704	4,722,612	691,634	657,155	82,792	1,762,947	195,628	3,413,412	72.3	1,309,200	1,035,758	861,961	1,120,489
	9 mos.	2,089	29,174,723	9,114,178	44,664,042	6,735,893	6,265,345	759,165	16,577,936	1,941,578	32,464,159	72.7	12,199,883	9,783,680	7,885,997	9,948,789
Brooklyn Eastern Dist. Term	Sept.	11	100,860	.....	102,120	7,465	11,427	51	30,078	5,722	54,743	53.6	47,377	40,972	40,972	43,638
	9 mos.	11	926,057	.....	938,669	89,983	108,140	4,350	290,450	52,324	545,247	58.1	393,422	332,931	332,931	340,082
Buffalo & Susquehanna	Sept.	253	115,612	358	133,830	20,800	26,228	2,068	36,245	6,954	92,295	69.0	41,535	39,435	40,615	53,220
	9 mos.	253	1,035,245	3,601	1,173,052	220,217	281,965	18,581	343,464	63,236	927,463	79.1	245,589	226,689	281,765	321,489
Buffalo, Rochester & Pittsburgh	Sept.	601	1,010,886	29,733	1,084,468	107,413	210,336	31,563	408,255	37,779	797,756	73.6	286,712	236,625	181,530	227,094
	9 mos.	601	9,011,572	311,601	9,672,507	1,145,097	2,509,968	254,354	3,848,919	354,332	8,128,377	84.0	1,544,130	1,332,815	1,156,875	1,574,407
Burlington-Rock Island	Sept.	310	88,216	1,909	96,325	14,078	10,669	5,608	39,166	9,233	77,380	80.3	18,945	12,864	1,470	—20,053
	9 mos.	341	949,765	23,319	1,029,629	210,350	137,674	57,754	457,778	93,293	951,981	92.5	77,648	13,463	—174,901	—787,913
Canadian Pac. Lines in Maine	Sept.	233	85,946	21,157	119,828	36,809	25,386	7,180	61,889	3,491	134,755	112.5	—14,927	—26,927	—40,437	—81,811
	9 mos.	233	1,306,228	198,177	1,616,606	498,447	370,041	68,842	742,848	37,030	1,717,208	106.2	—100,602	—208,602	—379,121	—261,135
Canadian Pacific Lines in Vermont	Sept.	85	73,154	22,562	120,963	13,976	17,607	2,150	74,988	3,119	111,823	92.4	9,140	5,120	—19,807	—146
	9 mos.	85	655,286	209,260	1,067,222	167,036	234,499	19,552	691,200	23,984	1,136,170	106.4	—68,948	—105,128	—342,888	—237,962
Central of Georgia	Sept.	1,944	1,076,037	123,001	1,341,061	147,896	221,482	58,537	563,875	79,512	1,076,732	80.3	264,329	155,513	147,878	459,563
	9 mos.	1,944	10,540,503	1,507,197	13,508,777	1,354,908	2,383,715	587,252	5,703,408	718,522	10,832,987	80.2	2,675,790	1,631,068	1,516,207	2,664,110
Central New Jersey	Sept.	692	2,313,184	605,809	3,138,872	285,282	634,713	61,726	1,289,744	108,475	2,399,840	76.5	739,032	208,439	125,956	724,874
	9 mos.	692	22,924,462	5,341,666	30,221,963	2,838,709	6,029,648	536,000	12,372,988	1,011,772	22,983,249	76.0	7,238,714	3,879,304	3,078,152	5,461,323
Central Vermont	Sept.	456	372,179	80,508	507,887	71,618	80,729	16,823	227,434	21,764	420,417	82.8	87,470	69,432	68,216	146,893
	9 mos.	456	3,954,481	668,546	5,130,183	1,013,569	916,760	159,574	2,100,327	213,088	4,510,735	87.9	619,448	489,325	543,205	991,850
Chesapeake & Ohio	Sept.	3,119	10,274,776	344,323	11,049,095	1,337,540	1,882,883	166,640	2,490,962	337,186	6,231,477	56.4	4,817,618	4,073,694	4,047,080	4,276,767
	9 mos.	3,119	84,242,918	3,267,570	91,886,579	11,916,736	17,226,183	1,562,139	22,952,285	3,037,904	56,851,874	61.9	35,034,705	27,487,912	27,427,430	30,014,401
Chicago & Eastern Illinois	Sept.	938	938,825	200,623	1,265,418	162,979	258,477	67,317	548,921	60,591	1,108,091	87.6	157,327	42,069	—114,927	21,203
	9 mos.	938	9,163,505	1,468,428	11,712,444	1,517,049	2,461,136	633,147	5,243,142	595,413	10,560,534	90.2	1,151,910	103,817	—1,210,296	—551,375
Chicago & Illinois Midland	Sept.	131	206,293	1,875	216,055	28,816	46,556	19,738	90,065	18,455	169,323	78.4	46,732	38,045	36,223	55,571
	9 mos.	131	1,928,072	24,142	2,021,695	230,575	462,961	187,628	874,638	175,077	1,669,404	82.6	352,291	284,948	238,428	355,911

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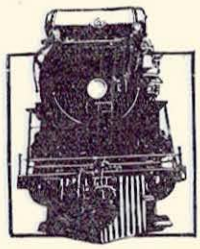
Do Not Put Obsolete Power Back Into Service



● *The best of the railroad's motive power is now being used to handle reduced traffic at reduced costs.*

Operation has been stepped up to the performance of this modern power.

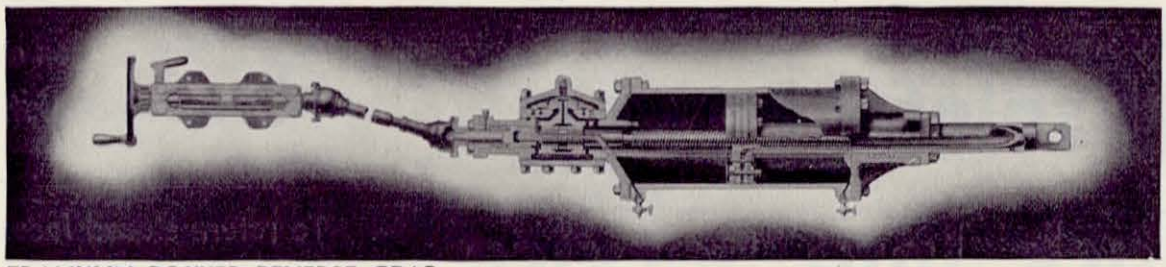
To return stored locomotives to service as business resumes will mean the introduction of less efficient power and an unfavorable effect on operating costs. That is one reason why they are not now in use.

Prepare now to keep operations on the present efficient basis by having new Super-Power locomotives ready for the increased load as business improves.

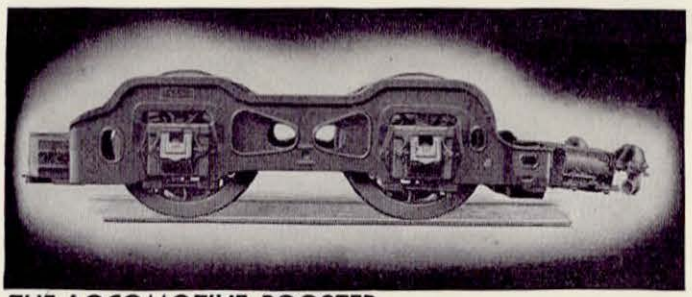
LIMA LOCOMOTIVE WORKS
Incorporated
LIMA OHIO

LIMA LOCOMOTIVE WORKS INCORPORATED

Why Saddle A Locomotive

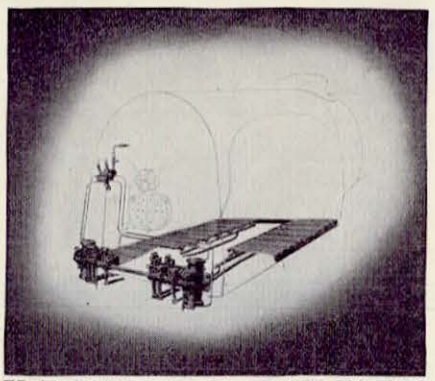


FRANKLIN POWER REVERSE GEAR

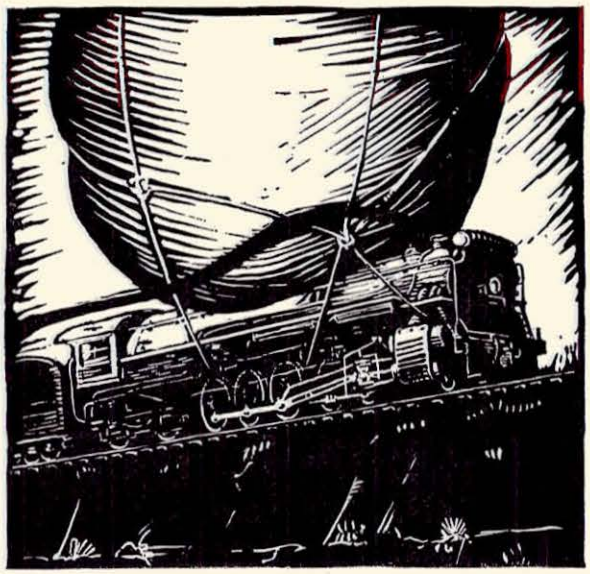


THE LOCOMOTIVE BOOSTER

The LIMITED *Cut-off*



FRANKLIN STEAM GRATE SHAKER



With *Useless* Weight?

At one time the only way to get more power was to add weight and increase the number of drivers.

That was before engineering refinements were developed that made each pound of locomotive weight more productive.

The Locomotive Booster now provides the power needed at starting and permits the designer to concentrate on getting high power out-put at high speeds.

Here again Franklin helps; this time with The Limited Cut-Off. By restoring the old principle of expansive use of steam, The Limited Cut-Off makes each pound of steam do more work. In addition it reduces the maximum variation in torque which permits a fuller use of driving wheel weight without slipping.

Then, too, there are other factors to be incorporated in the design of the modern locomotive if steam is to be made and used efficiently.

Consider the effect of Franklin Steam Grate Shakers in keeping fires clean and thereby aiding steam formation; also the accuracy of cut-off of Franklin Precision Power Reverse Gears which makes it easy for the engineer to use steam economically no matter how the speed changes.

All these capacity increasing factors are as necessary to the modern locomotive as the driving wheels.

THE FRANKLIN SLEEVE JOINT

An improved flexible joint that gives long service with little attention.

FRANKLIN RAILWAY SUPPLY CO., INC.

NEW YORK CHICAGO SAN FRANCISCO ST. LOUIS MONTREAL

Revenues and Expenses of Railways

MONTH OF SEPTEMBER AND NINE MONTHS OF CALENDAR YEAR 1931—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1930.
Chicago & North Western	Sept.	8,458	$6,602,634	$1,184,297	$8,729,311	$1,150,000	$1,735,539	$177,552	$3,339,447	$353,135	$6,794,797	77.8	$1,934,514	$1,322,382	$926,307	$3,024,110
	9 mos.	8,458	59,679,623	11,773,266	80,285,317	12,074,444	15,865,307	1,830,597	31,965,358	3,337,378	65,477,129	81.6	14,808,188	8,389,935	6,205,156	13,327,777
Chicago, Burlington & Quincy	Sept.	9,307	7,315,492	959,050	9,199,057	1,240,550	1,487,560	217,577	3,067,349	346,116	6,434,364	69.9	2,764,693	2,065,754	1,803,272	2,883,798
	9 mos.	9,314	67,885,065	8,923,759	85,758,101	10,985,572	13,517,413	2,250,794	28,869,221	3,184,366	59,446,947	69.3	26,311,154	18,618,149	16,339,651	21,356,101
Chicago Great Western	Sept.	1,495	1,493,381	100,614	1,717,426	248,632	200,816	78,850	611,722	60,599	1,204,662	70.1	512,764	437,125	215,401	453,943
	9 mos.	1,495	13,129,068	1,009,634	15,209,788	2,052,491	1,755,775	738,309	5,629,322	533,692	10,746,407	70.7	4,463,381	3,719,238	1,957,337	1,977,612
Chicago, Indianapolis & Louisville	Sept.	647	730,566	81,067	909,288	93,272	174,945	33,300	363,146	31,209	703,686	77.4	205,602	140,939	27,336	149,367
	9 mos.	647	6,918,204	844,617	8,639,822	868,688	1,764,126	313,597	3,489,149	302,333	6,817,054	78.9	1,822,768	1,245,176	229,065	947,045
Chicago, Mil., St. Paul & Pacific	Sept.	11,310	7,907,534	746,917	9,535,783	1,559,947	1,561,280	243,697	3,455,661	314,166	7,145,539	74.9	2,390,244	1,689,856	1,269,658	2,852,851
	9 mos.	11,319	70,454,069	7,123,080	86,081,067	13,984,341	16,841,513	2,562,118	33,053,339	3,006,411	69,404,490	80.6	16,676,577	9,885,985	6,175,525	12,175,298
Chicago River & Indiana	Sept.	20	.....	.....	451,482	32,000	25,000	1,827	139,530	14,935	213,292	47.2	238,190	184,272	255,438	289,845
	9 mos.	20	.....	.....	4,116,708	346,000	325,000	16,710	1,397,020	160,756	2,245,486	54.5	1,871,222	1,455,114	2,112,778	2,352,761
Chicago, Rock Island & Pacific	Sept.	7,620	5,850,149	860,053	7,377,203	856,988	1,211,767	239,189	2,713,436	339,035	5,439,015	73.7	1,938,188	1,419,099	1,066,922	2,202,507
	9 mos.	7,593	58,748,445	8,013,567	73,647,914	8,324,979	13,073,512	2,131,142	27,482,760	3,051,859	54,844,873	74.5	18,803,041	13,981,046	10,268,941	18,887,327
Chicago, Rock Island & Gulf	Sept.	722	462,199	30,404	491,590	44,197	35,991	20,778	136,828	21,464	262,009	53.3	229,581	197,415	178,096	70,349
	9 mos.	668	4,165,624	371,235	4,687,151	568,958	358,343	185,298	1,437,465	200,316	2,778,614	59.3	1,908,537	1,683,856	1,392,317	1,229,272
Chic., St. Paul, Minn. & Omaha	Sept.	1,736	1,247,718	221,358	1,608,087	256,000	300,583	38,217	690,585	81,388	1,377,335	85.7	230,752	132,124	40,800	358,141
	9 mos.	1,736	11,233,437	1,903,598	14,425,926	2,196,873	2,729,536	353,613	6,502,462	748,731	12,624,919	87.5	1,800,907	930,014	252,966	1,863,629
Clinchfield R. R.	Sept.	309	412,164	3,592	422,286	48,766	103,974	17,589	88,103	17,388	275,820	65.3	146,466	91,466	111,559	158,081
	9 mos.	309	3,991,099	56,555	4,123,156	476,144	1,021,911	169,781	904,474	161,326	2,732,951	66.3	1,390,205	820,192	1,102,719	1,425,079
Colorado & Southern	Sept.	1,037	607,825	55,837	726,518	103,188	130,320	18,558	231,207	37,715	522,728	71.9	203,790	136,714	101,093	147,234
	9 mos.	1,037	4,759,454	476,111	5,804,703	893,243	1,187,071	143,822	2,146,488	353,904	4,742,634	81.7	1,062,069	452,925	282,415	732,013
Ft. Worth & Denver City	Sept.	693	481,177	61,292	615,191	65,327	103,841	17,326	192,696	36,127	418,656	68.1	196,535	163,415	118,947	159,415
	9 mos.	695	4,854,441	638,213	6,051,356	617,369	898,420	177,280	1,791,597	338,049	3,846,136	63.6	2,205,220	1,858,156	1,664,924	1,576,966
Wichita Valley	Sept.	270	65,701	902	70,149	14,807	4,917	105	23,519	1,802	45,144	64.4	25,005	18,334	7,707	—7,363
	9 mos.	270	458,598	10,967	498,948	124,086	35,752	438	212,418	16,096	388,054	77.8	110,894	50,115	—44,922	—159,161
Columbus & Greenville	Sept.	167	75,185	6,043	86,281	11,462	15,565	3,556	35,527	10,613	76,717	88.9	9,564	5,564	4,635	130
	9 mos.	167	688,138	55,817	789,194	119,711	123,492	34,753	319,973	101,183	699,098	88.6	90,096	59,323	69,335	85,527
Conemaugh & Black Lick	Sept.	20	34,762	.....	53,298	7,954	10,655	400	22,879	3,243	45,131	84.7	8,167	7,267	9,869	11,595
	9 mos.	20	307,112	.....	574,844	75,610	147,275	4,504	356,141	30,798	614,328	106.9	—39,484	—47,584	—16,922	171,978
Delaware & Hudson	Sept.	858	2,153,427	233,183	2,580,355	325,011	588,792	49,895	910,689	137,272	2,029,495	78.7	551,860	488,985	475,467	904,654
	9 mos.	879	20,103,842	1,700,728	23,469,996	3,421,279	5,761,317	506,050	8,841,838	1,359,740	19,969,422	85.1	3,500,574	2,795,974	2,827,432	4,499,516
Delaware, Lackawanna & Western	Sept.	998	3,294,670	753,976	4,718,467	500,691	922,355	125,423	1,981,006	167,494	3,734,836	79.2	983,661	530,371	521,679	951,509
	9 mos.	998	32,117,793	6,686,742	44,932,510	4,575,903	8,556,263	1,223,923	19,020,257	1,566,674	35,304,455	78.6	9,628,055	5,523,526	5,450,906	8,247,777
Denver & Rio Grande Western	Sept.	2,557	2,086,932	181,102	2,401,443	271,844	298,856	50,401	660,370	85,789	1,382,178	57.6	1,059,315	889,270	871,848	570,334
	9 mos.	2,549	14,628,420	1,420,396	17,289,646	2,108,038	3,488,660	482,385	5,385,363	768,972	12,377,532	71.6	4,912,024	3,533,796	3,533,796	4,691,611
Denver & Salt Lake	Sept.	232	242,892	6,195	265,638	31,383	22,586	1,882	39,453	11,510	106,814	40.2	158,824	142,824	147,016	158,290
	9 mos.	232	1,374,392	76,491	1,581,978	283,779	302,168	17,382	284,192	97,346	984,867	62.3	597,111	453,094	500,702	552,023
Detroit & Mackinac	Sept.	242	69,763	4,882	86,065	10,343	10,096	1,552	27,248	3,755	52,982	61.6	33,083	25,857	25,553	6,616
	9 mos.	242	659,851	47,209	786,776	136,371	133,786	12,588	246,654	38,266	564,879	71.8	221,897	172,903	165,699	9,013
Detroit & Toledo Shore Line	Sept.	50	194,001	.....	197,725	19,463	25,779	7,578	60,218	10,300	121,023	61.2	76,702	56,995	17,161	17,141
	9 mos.	50	2,194,797	.....	2,227,614	251,528	241,282	69,007	629,935	74,623	1,258,551	56.5	969,063	765,074	537,985	539,702
Detroit Terminal	Sept.	19	.....	.....	48,449	5,317	8,113	.....	29,736	3,687	46,853	96.7	1,596	—9,618	—12,999	—2,896
	9 mos.	19	.....	.....	707,283	73,102	79,139	36	383,221	35,729	571,227	80.8	136,056	25,066	—41,573	99,286
Detroit, Toledo & Ironton	Sept.	487	321,244	1,218	336,978	42,768	66,456	11,927	129,886	24,241	272,771	80.9	64,207	18,613	4,124	156,303
	9 mos.	493	4,561,443	10,013	4,713,441	552,659	720,246	113,718	1,571,719	261,535	3,204,775	68.0	1,508,666	1,076,515	925,666	2,864,913
Duluth, Missabe & Northern	Sept.	563	1,636,757	3,688	1,866,164	150,859	200,773	3,305	316,685	41,094	712,646	38.2	1,153,518	1,044,834	1,038,821	1,520,665
	9 mos.	564	8,504,654	32,901	9,728,831	1,908,446	2,499,658	34,918	2,354,734	355,694	7,153,067	73.5	2,575,764	1,871,236	1,865,565	7,294,093
Duluth, Winnipeg & Pacific	Sept.	178	61,482	7,990	80,047	27,452	24,096	3,433	44,991	5,663	107,350	134.1	—27,303	—30,883	—44,264	5,319
	9 mos.	178	766,112	67,359	898,111	255,776	299,650	37,620	475,208	62,419	1,144,240	127.4	—246,129	—291,086	—273,535	399
Elgin, Joliet & Eastern	Sept.	447	795,321	1	874,290	140,767	196,683	15,190	409,627	50,311	812,534	92.9	61,756	—34,885	—97,738	11,078
	9 mos.	447	9,871,077	42	10,846,416	1,534,155	2,267,810	140,039	4,594,218	478,927	9,013,596	83.1	1,832,913	768,607	173,755	2,681,587
Erie Railroad	Sept.	2,046	5,201,669	624,340	6,421,648	980,374	1,249,002	157,668	2,565,641	295,561	5,278,860	82.2	1,142,788	727,118	607,181	1,441,727
	9 mos.	2,046	49,714,485	5,983,694	61,056,423	7,881,906	12,946,123	1,476,330	23,624,431	2,552,693	48,769,306	79.9	12,287,117	8,726,994	7,834,977	10,063,932
Chicago & Erie	Sept.	269	825,130	36,773	931,800	133,086	123,645	28,332	262,858	42,015	588,422	63.1	343,378	287,366	24,950	122,806
	9 mos.	269	7,343,270	343,795	8,279,013	1,059,952	1,060,190	261,061	2,494,648	372,624	5,242,960	63.3	3,036,053	2,531,581	326,053	1,025,362

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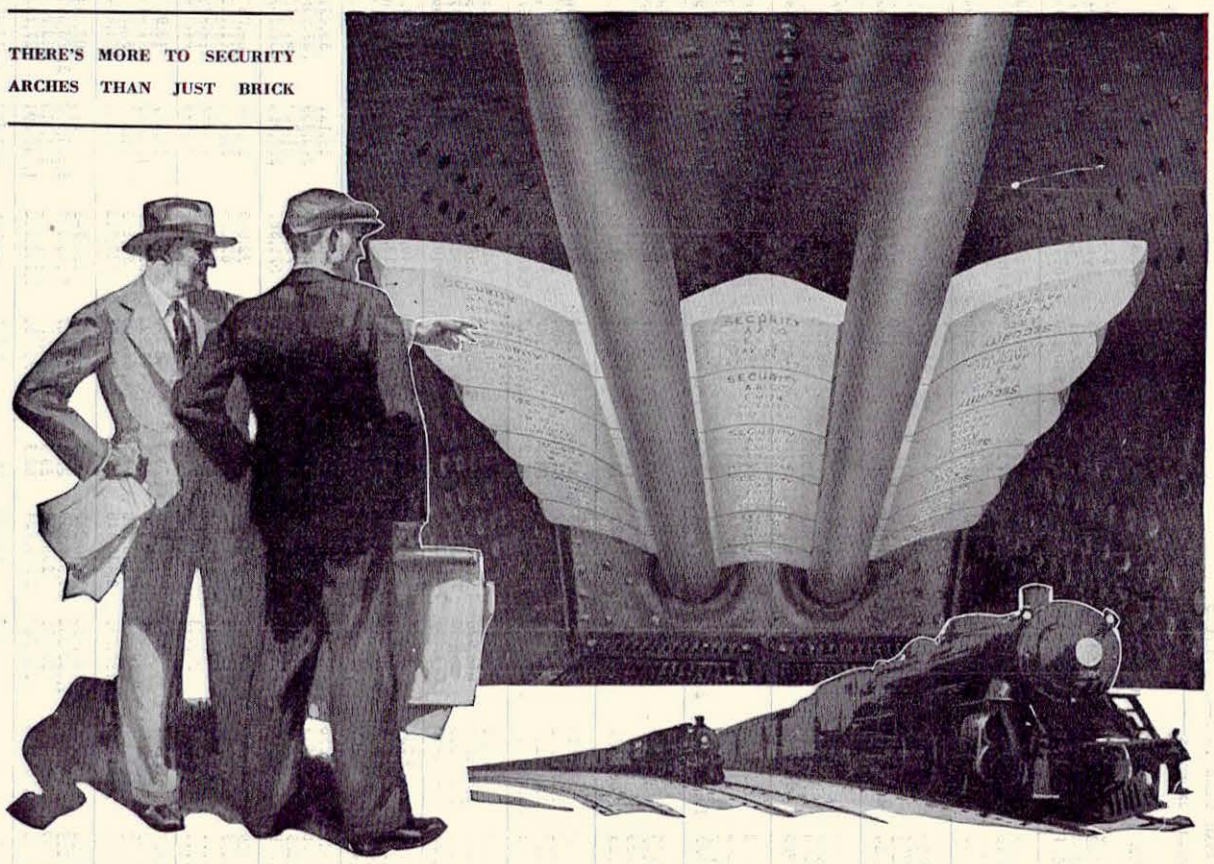
THERE'S MORE TO SECURITY ARCHES THAN JUST BRICK



But the Arch Brick was O. K.!

A hurried call brings an American Arch Company service man—something needs fixing.

Time and again the service man find the Arch Brick doing their job, but some other factor at fault.

He puts his finger on the trouble at once—he has seen it before on other roads—and soon the difficulties are ironed out.

By reason of their broad contact with locomotive combustion, American Arch Company service men possess a wealth of experience that means much to the railroads they serve.

Such advice and counsel on combustion improves Arch Brick service and dependability of operation and results in ultimate economy.

HARBISON-WALKER REFRACTORIES CO.
Refractory Specialists

AMERICAN ARCH CO.
INCORPORATED
Locomotive Combustion Specialists » » »

Revenues and Expenses of Railways

MONTH OF SEPTEMBER AND NINE MONTHS OF CALENDAR YEAR 1931—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1930.
New Jersey & New York	Sept.	45	$21,360	$83,279	$108,495	$12,142	$26,580	$1,276	$54,549	$3,714	$98,261	90.6	$102,234	$5,850	—$15,024	—$19,248
	9 mos.	45	214,285	759,389	1,006,329	105,579	206,192	12,362	509,331	32,131	865,584	86.0	140,745	101,220	—140,122	—184,101
N. Y., Susquehanna & Western	Sept.	131	222,020	33,030	278,630	49,032	48,948	4,504	125,804	12,899	241,179	86.6	37,451	4,747	—9,564	62,957
	9 mos.	131	2,691,862	310,864	3,260,641	391,260	451,012	42,674	1,321,116	114,509	2,320,411	71.2	940,230	645,081	418,772	460,060
Florida East Coast	Sept.	864	235,597	69,418	365,863	101,710	132,220	22,274	153,489	44,549	460,424	125.8	—94,561	—169,584	—202,739	—169,283
	9 mos.	864	4,336,612	2,148,091	7,483,170	1,072,717	1,311,756	252,716	2,216,358	413,521	5,392,733	72.1	2,090,437	1,098,593	560,995	895,941
Fort Smith & Western	Sept.	249	59,385	2,274	65,816	14,516	14,322	4,670	25,285	5,357	63,824	97.0	1,992	—1,608	—9,881	17,694
	9 mos.	249	505,293	27,301	580,041	123,645	126,057	42,917	251,277	48,739	587,906	101.4	—7,865	—40,334	—120,053	3,763
Galveston Wharf	Sept.	13	.....	.....	188,325	37,164	6,400	4,775	27,817	9,184	102,620	54.5	85,705	62,705	62,884	70,813
	9 mos.	13	.....	.....	1,347,665	328,486	44,880	36,673	257,549	73,677	877,518	65.1	570,147	262,912	264,791	248,753
Georgia R. R.	Sept.	328	266,470	25,279	318,638	29,592	66,039	19,243	145,911	22,127	283,472	89.0	35,166	27,426	47,443	75,723
	9 mos.	328	2,656,856	263,467	3,166,041	327,371	595,470	188,824	1,412,916	207,039	2,735,592	86.4	430,449	360,182	458,295	533,805
Georgia & Florida	Sept.	463	90,057	2,907	98,283	22,728	18,009	9,754	40,887	7,606	99,139	100.9	—856	—8,356	—6,181	24,367
	9 mos.	463	1,026,084	30,145	1,111,566	265,173	185,592	93,129	437,240	68,845	1,051,345	94.6	60,221	—7,281	—39,176	73,434
Grand Trunk Western	Sept.	1,021	1,216,467	112,994	1,432,118	260,381	343,817	50,400	749,698	99,216	1,514,587	105.8	—82,469	—199,526	—312,346	—215,628
	9 mos.	1,020	13,631,546	1,047,190	15,842,081	2,525,343	3,292,390	551,493	7,071,942	930,153	14,428,444	91.1	1,413,637	349,727	—1,082,220	482,424
Can. National Lines in New Eng.	Sept.	172	90,561	13,839	120,101	31,071	16,667	4,012	76,378	10,643	139,695	116.3	—19,594	—32,904	—88,505	—92,856
	9 mos.	172	893,393	135,441	1,166,801	256,110	292,144	45,148	717,571	80,657	1,414,835	121.3	—248,034	—377,259	—802,029	—809,214
Great Northern	Sept.	8,347	6,422,402	564,672	7,702,968	679,412	1,111,538	187,705	2,272,720	215,042	4,411,229	57.3	3,291,739	2,646,102	2,420,338	5,375,134
	9 mos.	8,362	47,550,381	4,814,562	58,268,342	7,873,117	11,489,229	1,975,479	19,652,545	2,047,475	43,389,462	74.5	14,878,880	8,911,147	7,625,777	13,913,179
Green Bay & Western	Sept.	234	109,048	1,753	118,139	21,497	12,719	5,111	39,045	2,198	80,504	68.1	37,635	31,543	29,156	29,823
	9 mos.	234	1,026,975	15,436	1,077,727	194,436	188,066	51,147	435,719	26,074	895,086	83.1	182,641	118,512	100,245	201,768
Gulf & Ship Island	Sept.	307	100,359	13,311	131,286	13,485	16,428	4,455	61,534	5,929	102,915	78.4	28,371	4,357	—6,429	16,309
	9 mos.	307	950,954	156,571	1,303,508	321,143	222,530	39,585	663,339	59,503	1,316,422	101.0	—12,914	—271,145	—386,417	—53,723
Gulf, Mobile & Northern	Sept.	733	284,393	10,635	312,923	38,247	68,269	20,285	116,184	18,399	261,384	83.53	51,539	24,416	3,621	67,338
	9 mos.	733	2,868,564	105,809	3,132,601	478,396	572,326	221,402	1,172,982	187,266	2,633,197	84.06	499,404	255,156	41,805	433,797
Illinois Central	Sept.	5,018	6,175,886	904,714	7,687,435	1,111,131	1,727,659	215,397	3,011,281	357,533	6,479,848	84.3	1,207,587	789,167	735,574	2,276,809
	9 mos.	5,018	60,180,981	9,664,803	76,623,082	9,404,539	17,176,313	2,142,693	30,470,064	3,255,509	63,017,860	82.2	13,605,222	8,482,713	7,449,864	14,002,387
Yazoo & Mississippi Valley	Sept.	1,681	1,249,836	106,041	1,438,685	249,285	241,116	28,203	576,272	70,517	1,168,445	81.2	270,240	142,941	27,413	472,568
	9 mos.	1,682	10,859,302	1,151,152	12,837,320	2,184,103	2,344,122	358,640	5,524,399	616,026	11,052,297	86.1	1,785,023	358,233	—755,430	1,581,575
Illinois Central System	Sept.	6,700	7,425,722	1,010,755	9,126,120	1,360,416	1,968,775	243,600	3,587,553	428,050	7,648,293	83.8	1,477,827	932,108	762,987	2,749,377
	9 mos.	6,701	71,040,283	10,815,955	89,460,402	11,588,642	19,520,435	2,501,333	35,994,463	3,871,535	74,070,157	82.8	15,390,245	8,840,946	6,694,434	15,587,406
Illinois Terminal	Sept.	543	441,141	70,241	535,497	63,071	65,276	17,648	179,731	30,877	353,535	66.02	181,962	149,402	116,501	160,897
	9 mos.	555	3,986,265	751,112	4,970,852	573,171	616,843	174,893	1,599,970	318,518	3,269,747	65.78	1,701,105	1,418,617	1,156,640	1,093,870
Kansas City Southern	Sept.	784	904,260	40,785	1,044,048	76,213	117,373	43,461	275,550	56,233	572,485	54.8	471,563	376,154	338,717	288,890
	9 mos.	784	8,126,136	401,282	9,620,844	878,857	1,563,295	462,468	2,937,100	600,008	6,443,137	67.0	3,177,707	2,306,983	1,965,730	2,716,510
Texarkana & Ft. Smith	Sept.	99	111,609	2,395	125,058	17,023	11,272	5,529	36,356	7,912	79,663	63.7	45,395	36,766	16,121	59,851
	9 mos.	99	1,275,119	26,238	1,464,137	148,661	105,845	63,316	400,629	88,544	824,955	56.3	639,182	561,156	346,369	387,636
Kansas, Oklahoma & Gulf	Sept.	326	213,640	538	217,723	24,549	21,399	12,289	50,813	9,902	118,765	54.5	98,958	79,357	61,708	91,612
	9 mos.	326	1,943,774	9,302	1,991,457	236,792	219,384	122,039	472,580	100,828	1,145,951	57.5	845,506	676,883	500,900	656,567
Lake Superior & Ishpeming	Sept.	160	115,838	127	134,657	25,227	21,114	509	27,700	8,756	83,306	61.9	51,351	32,050	30,438	64,725
	9 mos.	160	882,100	3,862	1,019,714	211,117	223,762	5,295	279,778	71,108	791,049	77.6	228,665	67,076	52,511	511,132
Lake Terminal	Sept.	12	.....	.....	59,356	3,788	3,999	.....	24,534	3,602	35,923	60.5	23,433	17,452	19,847	12,530
	9 mos.	12	.....	.....	507,071	65,191	71,906	.....	259,076	20,023	416,196	82.1	90,875	51,232	49,818	52,073
Lehigh & Hudson River	Sept.	96	152,215	965	162,230	18,623	24,115	3,537	57,927	9,858	114,060	70.3	48,170	34,209	19,207	18,931
	9 mos.	96	1,435,034	6,877	1,519,618	175,548	242,573	33,359	537,880	84,936	1,074,296	70.7	445,322	320,187	170,543	197,418
Lehigh & New England	Sept.	216	318,569	508	322,803	50,971	72,757	4,673	112,338	17,960	258,698	80.1	64,105	53,568	61,831	50,506
	9 mos.	216	3,068,394	7,031	3,105,793	434,946	703,111	45,600	1,105,452	187,395	2,476,416	79.7	629,377	527,712	607,983	701,854
Lehigh Valley	Sept.	1,361	3,108,296	356,293	3,795,020	432,857	872,073	124,382	1,662,720	121,450	3,236,267	85.3	558,653	262,742	170,884	603,054
	9 mos.	1,361	31,951,730	3,293,204	38,405,546	3,793,607	8,801,706	1,181,215	16,345,045	1,192,302	31,520,919	82.1	6,884,627	4,245,169	3,339,909	5,886,692
Louisiana & Arkansas	Sept.	608	498,527	11,557	534,428	52,622	75,270	19,949	125,647	22,309	296,358	55.5	238,070	180,732	161,519	152,767
	9 mos.	608	4,036,593	120,830	4,399,805	599,657	587,455	186,358	1,165,738	207,580	2,749,724	62.5	1,650,081	1,205,862	1,040,891	927,358
Louisiana, Arkansas & Texas	Sept.	202	49,964	605	53,083	15,735	8,667	1,691	20,065	4,623	50,721	95.6	2,362	—144	—5,584	—13,833
	9 mos.	202	504,582	9,754	538,920	157,368	78,538	29,578	218,917	41,464	525,705	97.6	13,215	—18,267	—77,261	—185,605
Louisville & Nashville	Sept.	5,264	5,688,775	592,504	6,753,101	1,058,283	1,548,293	165,769	3,584,187	350,853	5,743,535	85.1	1,009,566	589,552	708,293	1,856,862
	9 mos.	5,266	56,363,988	6,335,665	67,399,676	10,109,430	14,822,023	1,994,574	25,344,085	3,394,179	56,007,326	83.1	11,392,350	7,112,357	7,244,285	9,429,645

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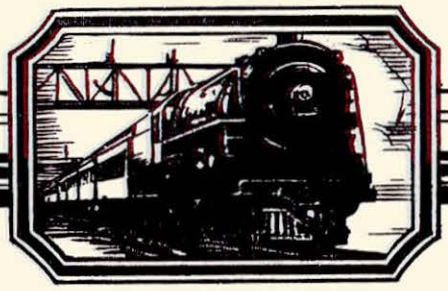

Alco Alco

TO ECONOMIZE— MODERNIZE

Locomotives in service on Class 1 lines numbered 55,600 in 1930.

On the assumption that 45,000 modern locomotives, properly distributed, would be a sufficient inventory, a 25 year replacement program would call for 1800 new locomotives per year.

But for the last five years, 1927-1931, orders for new locomotives have averaged approximately 600 per year. At this rate the replacement of 45,000 locomotives will take 75 years.

And the inventory starting out is already 80 per cent over 10 years old and 45 per cent over 20 years old.

Sooner or later a greater proportion of the money spent for improvements must be allotted to new locomotives. Otherwise, a bad condition is rapidly going to get much worse.

American Locomotive Company
30 Church Street New York N.Y.

Alco Alco

Revenues and Expenses of Railways

MONTH OF SEPTEMBER AND NINE MONTHS OF CALENDAR YEAR 1931—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1930
Maine Central	Sept.	1,121	$912,961	$168,856	$1,224,174	$190,906	$176,782	$20,627	$478,812	$42,855	$914,703	$74.7	$309,471	$219,460	$189,750	$285,915
	9 mos.	1,121	8,805,855	1,673,291	11,630,591	1,843,526	1,902,977	176,407	4,562,868	410,131	8,918,328	76.7	2,712,263	1,950,065	1,532,758	2,282,630
Midland Valley	Sept.	363	184,080	2,075	191,563	25,605	16,406	4,277	47,390	8,187	101,499	53.0	90,064	78,068	64,817	124,637
	9 mos.	363	1,501,805	22,839	1,579,954	265,711	172,083	44,595	424,217	91,405	993,705	62.9	586,249	473,321	371,267	681,630
Minneapolis & St. Louis	Sept.	1,627	781,251	31,396	868,057	135,678	160,543	33,757	390,614	43,959	763,860	88.0	104,197	63,594	34,215	251,533
	9 mos.	1,627	7,218,329	297,579	8,025,949	1,094,903	1,591,203	331,122	3,709,925	434,559	7,158,499	89.2	867,450	409,844	137,546	424,907
Minn., St. Paul & S. S. Marie	Sept.	4,346	2,096,923	207,958	2,540,127	315,705	416,475	69,763	972,787	111,900	1,899,997	74.8	640,130	425,867	275,521	1,491,545
	9 mos.	4,372	18,503,716	1,801,580	22,363,850	3,168,676	4,374,580	686,367	9,205,906	1,089,015	18,648,139	83.4	3,715,711	1,813,137	565,037	3,189,321
Duluth, South Shore & Atlantic	Sept.	560	163,201	24,385	210,702	34,674	43,426	7,174	93,161	8,362	185,300	87.9	25,402	—3,598	—7,916	—2,042
	9 mos.	560	1,720,978	202,649	2,149,688	444,633	397,595	69,659	970,076	87,689	1,982,056	92.2	167,632	—100,402	—149,717	42,020
Spokane International	Sept.	163	60,261	2,860	67,707	20,938	5,804	3,032	24,873	5,027	60,273	89.0	7,434	2,366	—2,077	11,938
	9 mos.	163	525,063	32,128	601,579	143,057	57,880	29,738	224,824	50,165	511,341	85.0	90,238	44,747	8,438	56,240
Mississippi Central	Sept.	150	81,458	1,931	85,912	12,145	11,121	8,115	22,318	5,933	59,632	69.4	26,280	19,640	14,536	25,116
	9 mos.	150	727,853	21,394	772,941	121,519	108,857	77,773	227,861	57,834	593,846	76.8	179,095	127,478	89,751	149,380
Missouri & North Arkansas	Sept.	364	74,081	1,778	81,612	27,318	13,562	9,177	31,926	7,553	89,470	109.6	—7,858	—10,258	—18,031	564
	9 mos.	364	817,994	20,717	893,883	213,451	127,283	84,270	357,782	71,599	853,295	95.5	40,588	17,719	—74,712	40,712
Missouri-Illinois	Sept.	202	118,116	936	121,523	7,818	19,840	3,327	32,190	5,933	69,253	57.0	52,270	45,725	38,530	23,806
	9 mos.	202	1,006,598	8,565	1,037,183	153,308	212,678	30,560	313,293	55,145	763,147	73.6	274,036	219,086	144,353	237,071
Missouri-Kansas-Texas Lines	Sept.	3,188	2,363,948	272,473	2,919,597	310,957	376,931	127,857	925,696	143,029	1,901,489	65.1	1,018,108	812,190	637,491	1,155,215
	9 mos.	3,188	20,290,292	2,664,950	25,537,716	3,201,024	4,372,641	1,149,316	8,860,460	1,421,792	19,163,787	75.0	6,373,929	4,521,204	2,677,554	6,158,538
Missouri Pacific	Sept.	7,435	6,361,936	548,183	7,549,635	983,610	1,241,949	262,296	2,754,524	313,694	5,563,254	73.7	1,986,381	1,828,626	1,622,253	2,057,878
	9 mos.	7,447	6,204,700	5,695,668	74,235,423	8,981,002	12,527,047	2,466,080	26,720,701	3,023,530	53,823,389	72.5	20,412,034	16,980,024	13,730,845	15,550,714
Gulf Coast Lines	Sept.	1,037	508,750	50,388	610,775	99,154	153,141	37,925	206,043	52,884	551,519	90.30	59,256	9,309	7,745	205,208
	9 mos.	1,937	7,659,990	629,310	8,819,473	1,233,963	1,536,891	390,871	2,472,478	532,498	6,172,233	69.98	2,647,240	2,203,749	1,512,824	2,832,508
International-Great Northern	Sept.	1,159	972,971	91,000	1,177,099	165,141	190,655	33,309	443,364	58,614	901,233	76.56	275,866	232,325	168,046	349,686
	9 mos.	1,159	12,858,386	970,977	14,804,308	1,965,087	2,249,020	337,895	5,507,650	576,334	10,623,004	71.76	4,181,304	3,800,717	2,286,829	592,835
San Antonio, Uvalde & Gulf	Sept.	316	82,869	7,647	98,733	25,164	14,033	4,946	30,564	5,411	79,597	80.6	19,136	14,458	—10,530	6,204
	9 mos.	316	946,352	88,216	1,116,619	302,514	152,836	48,520	283,489	57,216	842,893	75.5	273,726	231,053	—14,096	142,070
Mobile & Ohio	Sept.	1,152	658,769	34,386	739,392	124,176	152,813	46,626	340,888	49,829	713,607	96.5	25,785	—21,633	—75,157	14,433
	9 mos.	1,152	7,075,085	331,825	7,886,221	1,141,119	1,522,591	447,780	3,319,722	444,403	6,862,665	87.0	1,023,556	472,147	—66,997	691,278
Monongahela	Sept.	177	314,040	1,752	318,410	25,000	40,000	1,315	79,619	9,384	155,271	48.8	163,139	150,040	82,043	112,166
	9 mos.	177	3,317,863	24,547	3,568,337	470,000	450,000	11,747	858,639	91,589	1,831,441	51.3	1,736,896	1,604,123	907,015	1,020,526
Monongahela Connecting	Sept.	6	.....	.....	58,012	9,203	21,388	269	36,192	2,495	69,547	119.9	—11,535	—17,007	—16,757	10,867
	9 mos.	6	.....	.....	821,009	114,332	220,239	2,543	437,328	24,932	799,374	97.4	21,635	—26,504	—24,746	200,904
Montour	Sept.	57	192,629	.....	193,604	20,325	38,036	1,383	41,402	6,850	107,996	55.8	85,608	83,518	102,086	95,463
	9 mos.	57	1,606,503	.....	1,615,589	195,472	367,989	12,719	412,025	66,230	1,052,513	65.1	563,076	544,436	699,764	711,976
Nashville, Chatt. & St. Louis	Sept.	1,203	863,893	100,032	1,083,800	168,354	235,511	59,243	453,044	71,056	992,755	91.6	91,045	55,496	47,491	235,607
	9 mos.	1,203	9,498,470	1,139,238	11,730,556	2,027,960	2,457,943	622,934	4,675,276	688,913	10,525,111	89.7	1,205,445	719,179	571,175	1,770,498
Nevada Northern	Sept.	165	31,332	2,562	38,237	10,800	5,444	891	10,848	4,698	32,681	85.4	5,556	—3,963	320	15,175
	9 mos.	165	317,451	16,177	378,772	101,805	44,592	8,899	102,142	42,016	299,401	79.0	79,371	—250,309	—225,666	177,476
Newburgh & South Shore	Sept.	6	.....	.....	48,567	7,084	25,690	.....	28,613	6,037	67,424	138.8	—18,857	—30,724	—26,856	—19,105
	9 mos.	6	.....	.....	743,173	121,631	209,767	.....	350,983	60,185	742,566	99.9	607	—100,580	—73,631	162,375
New Orleans Great Northern	Sept.	264	191,359	11,051	210,712	16,278	22,308	13,273	62,010	8,936	122,805	58.3	87,907	77,433	49,705	33,450
	9 mos.	264	1,630,077	98,147	1,785,324	159,151	239,219	129,805	522,638	92,806	1,143,619	64.1	641,705	548,273	347,501	239,926
New Orleans Terminal	Sept.	20	1,739	.....	188,645	12,166	8,199	.....	40,040	1,384	61,789	32.8	126,856	114,884	91,438	34,913
	9 mos.	20	18,545	.....	1,318,291	146,368	80,756	.....	426,577	14,160	667,861	50.7	650,430	542,780	348,965	337,269
New York Central	Sept.	11,421	19,983,922	7,150,839	31,269,317	4,498,215	6,880,180	694,669	11,365,935	1,331,677	25,243,623	80.7	6,025,694	3,322,705	2,183,913	5,615,570
	9 mos.	11,421	190,035,344	67,827,959	296,329,639	37,767,437	63,249,907	6,680,460	111,434,316	12,076,319	235,848,221	79.6	60,481,418	35,687,356	24,647,729	46,639,745
Indiana Harbor Belt	Sept.	118	.....	.....	752,228	84,000	75,000	5,018	294,883	27,385	504,892	67.1	247,336	203,180	128,389	209,182
	9 mos.	118	.....	.....	6,992,690	658,000	795,000	42,186	3,080,954	254,349	4,982,498	71.3	2,010,192	1,614,324	1,163,523	1,887,157
Pittsburgh & Lake Erie	Sept.	234	1,234,782	80,052	1,359,319	87,687	431,987	32,948	551,983	75,519	1,183,690	87.1	175,629	76,655	238,937	656,437
	9 mos.	234	12,563,803	924,815	13,909,083	1,286,051	4,245,777	303,262	5,462,795	698,226	12,028,227	86.5	1,880,856	934,799	2,580,152	5,756,928
New York, Chicago & St. Louis	Sept.	1,698	2,647,176	129,312	2,896,328	405,111	501,194	118,484	1,140,890	120,837	2,357,900	81.4	538,428	328,676	94,455	675,577
	9 mos.	1,698	26,147,608	1,172,259	28,379,207	3,808,571	4,807,978	1,101,760	10,777,778	1,134,541	21,706,745	76.5	6,672,462	4,676,065	2,238,409	4,853,856
N. Y., New Haven & Hartford	Sept.	2,069	4,407,402	2,862,566	8,228,183	1,412,181	1,209,297	107,225	2,704,382	234,200	5,802,769	70.5	2,425,414	2,075,293	1,451,442	3,041,828
	9 mos.	2,105	41,339,791	26,572,480	76,026,346	10,885,152	11,429,554	886,745	25,833,177	2,616,831	53,059,363	69.2	23,566,983	19,310,422	13,863,592	28,127,388

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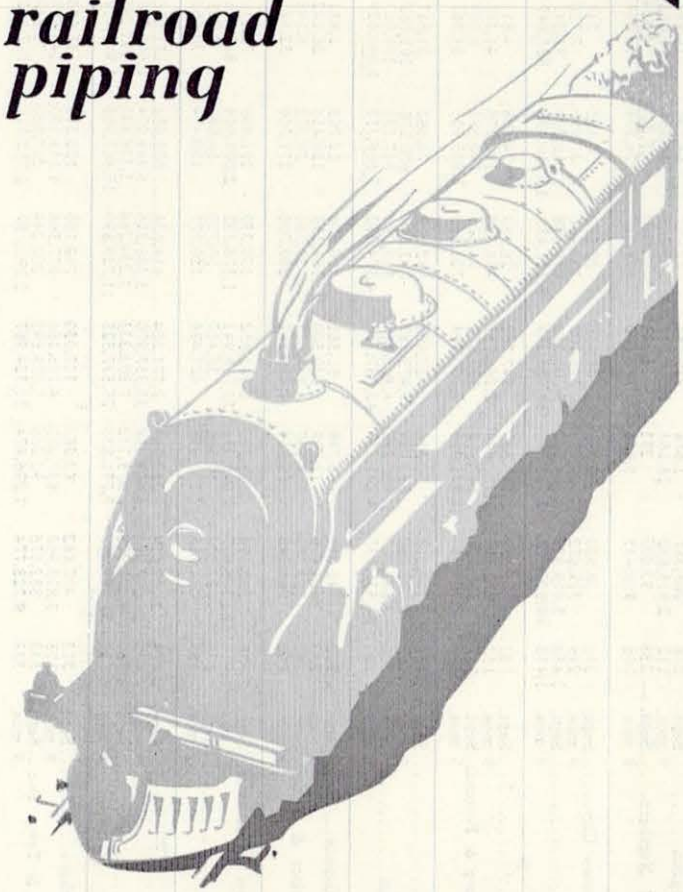
for railroad piping



HERE is a simple but effective means of prolonging the life and efficiency of all railway piping exposed to corrosive action of the atmosphere—a protection of major importance wherever piping is subjected to a wide range of temperatures and to alternate wet and dry conditions.

NATIONAL Copper-Steel Pipe is the same high-grade steel pipe that railroads have been using for many years, with the addition of a small percentage of pure copper, which thoroughly alloys with the highly refined steel. The fact that the protection offered by copper-steel is a part of the pipe itself and causes no inconvenience or extra work after installation, makes the use of this product an ideal method of minimizing losses from atmospheric corrosion, while the saving secured through increased life of the pipe is far in excess of the small additional investment involved.

Being the pioneer in the research and development of copper-steel pipe, National Tube Company recommends this product for all piping on locomotives and cars and for other purposes, such as signal pipe, tubular poles, etc., where pipe is subjected to atmospheric corrosion. Ask for Bulletin No. 11, describing

NATIONAL COPPER-STEEL PIPE
The Original Copper-Steel Pipe

LOOK FOR THE GREEN COLOR!
NATIONAL *Copper-Steel Pipe is marked as follows:* Black Pipe—*Smaller sizes colored green. Larger sizes, two green stripes running lengthwise.* Galvanized Pipe—*All sizes, two green stripes running lengthwise.*

NATIONAL TUBE COMPANY, Pittsburgh, Pa.
Subsidiary of United States Steel Corporation

NATIONAL COPPER-STEEL PIPE

Revenues and Expenses of Railways

MONTH OF SEPTEMBER AND NINE MONTHS OF CALENDAR YEAR 1931—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1930.
New York Connecting	Sept.	20	$143,692	$.....	$164,215	$23,464	$9,504	$.....	$34,756	$1,133	$68,857	41.9	$95,358	$59,358	$29,215	$73,493
	9 mos.	20	1,483,039	.....	1,652,485	199,374	70,644	.....	321,223	11,008	602,249	36.4	1,050,236	722,636	463,039	726,597
New York, Ontario & Western	Sept.	568	751,227	105,323	1,000,666	118,755	170,676	15,157	389,729	27,915	724,327	72.4	276,339	233,746	146,601	188,991
	9 mos.	568	6,489,653	1,039,125	8,834,394	1,065,437	1,487,383	135,964	3,385,827	253,261	6,358,040	72.0	2,476,354	2,092,374	1,466,513	845,249
Norfolk & Western	Sept.	2,282	6,509,389	223,463	6,972,147	811,887	1,239,067	114,174	1,721,330	245,901	4,143,312	59.4	2,828,835	2,178,733	2,377,048	3,248,174
	9 mos.	2,253	55,996,946	2,090,558	60,301,821	7,276,558	11,760,233	1,108,443	15,822,710	2,327,055	38,369,742	63.6	21,932,079	15,803,134	17,075,534	25,526,992
Norfolk Southern	Sept.	932	467,911	15,250	505,006	77,315	70,002	22,545	196,200	25,561	391,623	77.5	113,383	64,571	47,895	60,714
	9 mos.	932	4,352,493	150,126	4,725,871	714,983	716,860	226,926	1,914,547	224,874	3,796,978	80.3	928,893	489,141	328,893	483,462
Northern Pacific	Sept.	6,789	4,816,353	460,717	5,791,388	524,151	1,074,698	185,584	1,954,445	265,222	4,100,077	70.8	1,691,311	1,006,775	1,265,856	2,988,759
	9 mos.	6,789	38,579,135	4,431,007	47,646,803	6,593,892	10,956,706	1,849,726	17,994,038	2,316,370	40,487,881	85.	7,158,922	1,195,250	3,773,600	8,893,221
Northwestern Pacific	Sept.	441	272,615	114,233	422,276	59,329	55,980	5,553	180,141	17,063	317,854	75.3	104,422	73,574	60,430	61,471
	9 mos.	441	1,904,005	1,059,071	3,281,941	704,718	571,195	53,774	1,614,465	153,323	3,093,288	94.3	188,653	—120,303	—218,140	196,563
Oklahoma City-Ada-Atoka	Sept.	132	46,418	1,024	51,051	23,102	3,251	1,634	16,058	2,769	46,516	91.1	4,535	—607	—10,030	4,364
	9 mos.	132	489,459	12,929	524,572	148,452	33,536	12,008	155,330	26,950	370,027	70.5	154,545	109,133	3,669	—34,164
Pennsylvania Railroad	Sept.	10,914	26,017,872	7,025,921	36,968,283	3,190,841	7,127,289	705,151	14,060,362	1,524,839	27,079,771	73.3	9,888,512	6,701,785	5,592,857	8,968,140
	9 mos.	10,914	244,152,362	68,269,383	347,170,749	41,475,476	72,761,754	7,012,876	134,790,170	14,242,654	275,095,069	79.2	72,075,680	48,666,164	38,201,125	73,111,792
Long Island	Sept.	404	768,094	2,241,133	3,167,769	273,139	363,787	16,094	1,216,158	57,112	1,926,992	60.8	1,240,777	820,503	592,638	901,528
	9 mos.	404	7,183,391	19,494,381	28,080,829	2,548,293	4,039,978	158,988	10,995,622	548,349	18,293,344	65.1	9,787,485	7,143,099	5,461,755	6,282,360
Peoria & Pekin Union	Sept.	17	8,436	341	81,072	12,461	8,011	5,272	42,684	7,705	76,133	93.9	4,939	—9,561	9,722	73,550
	9 mos.	17	76,463	4,052	836,056	113,495	98,441	44,542	428,439	68,198	753,115	90.1	82,941	—55,342	158,406	302,411
Pere Marquette	Sept.	2,264	1,868,344	125,686	2,138,151	399,884	421,471	66,004	879,345	103,998	1,879,297	87.9	258,854	119,746	—10,380	556,313
	9 mos.	2,265	18,330,624	1,240,983	20,881,172	3,536,774	4,153,234	638,545	8,424,151	955,639	17,780,139	85.1	3,101,033	1,751,135	876,555	3,900,388
Pittsburg & Shawmut	Sept.	102	66,512	809	67,837	5,913	17,209	1,788	17,869	4,292	47,071	69.4	20,766	19,702	21,982	23,248
	9 mos.	102	669,016	10,154	685,663	105,375	184,840	13,941	184,495	35,599	524,250	76.5	161,413	149,809	159,542	246,989
Pittsburgh & West Virginia	Sept.	138	208,357	1,674	229,484	32,717	64,721	16,982	54,516	15,194	192,161	83.7	37,323	8,809	29,036	119,526
	9 mos.	112	2,015,632	18,163	2,244,236	255,765	598,361	171,462	496,136	156,025	1,757,747	78.3	486,489	246,701	475,363	1,277,191
Pittsburg, Shawmut & Northern	Sept.	188	93,007	291	95,141	22,965	17,284	1,514	33,336	6,653	81,752	85.9	13,389	10,628	7,640	15,207
	9 mos.	198	950,435	3,438	972,100	178,215	174,974	13,244	333,105	60,624	760,162	78.2	211,938	186,610	154,320	114,903
Quincy, Omaha & Kansas City	Sept.	249	33,933	2,380	41,330	30,532	4,591	748	18,227	1,864	55,949	135.4	—14,619	—19,376	—21,906	6,623
	9 mos.	249	319,652	29,389	395,109	183,496	47,990	7,732	174,655	19,719	432,775	109.5	—37,666	—80,484	—102,738	—61,353
Reading	Sept.	1,458	5,019,829	354,132	5,700,313	648,898	1,219,299	85,245	2,200,801	197,164	4,374,962	76.7	1,325,351	1,102,175	1,049,072	1,249,048
	9 mos.	1,456	46,820,271	3,505,595	53,753,249	8,127,453	13,930,435	827,949	22,053,808	1,959,589	47,090,143	87.6	6,663,106	4,678,186	4,391,556	8,349,304
Atlantic City	Sept.	163	85,732	143,830	247,762	26,183	24,608	4,811	161,751	4,362	221,847	89.5	25,915	—14,535	—24,771	—93,967
	9 mos.	163	912,116	1,212,643	2,266,155	406,826	196,776	41,338	1,463,903	43,035	2,153,397	95.0	112,758	—252,321	346,161	—510,552
Richmond, Fredericksburg & Potomac	Sept.	117	238,129	147,502	500,872	96,621	140,697	9,034	222,639	35,513	514,972	102.8	—14,100	21,637	—8,125	33,708
	9 mos.	117	3,906,567	1,925,446	7,130,194	720,268	1,335,935	84,965	2,589,971	331,977	5,221,043	73.2	1,909,151	1,572,044	1,045,347	1,015,239
Rutland	Sept.	413	240,255	70,330	423,698	82,119	70,682	11,817	163,380	16,281	346,202	81.7	77,496	52,351	55,270	107,681
	9 mos.	413	2,071,182	553,724	3,479,287	702,268	670,176	101,062	1,483,056	151,925	3,112,781	89.5	366,506	174,091	215,116	487,462
St. Louis-San Francisco	Sept.	5,266	3,695,513	403,799	4,463,414	510,291	817,133	108,067	1,498,882	184,871	3,147,470	70.52	1,315,944	1,004,941	977,905	1,609,996
	9 mos.	5,266	34,535,057	4,241,237	42,387,722	4,574,032	7,586,355	1,060,629	15,116,766	1,803,000	30,452,855	71.84	11,934,867	8,834,911	8,424,277	12,515,782
Ft. Worth & Rio Grande	Sept.	233	41,641	2,749	51,561	16,616	12,763	2,831	31,351	2,302	65,430	126.9	—13,869	—18,296	—27,163	—24,708
	9 mos.	233	424,436	32,599	520,509	164,535	120,416	28,142	308,415	37,362	657,962	126.4	—137,453	—178,562	—259,749	—223,097
St. Louis-San Francisco & Texas	Sept.	262	122,779	4,557	131,623	23,366	20,372	6,198	49,838	7,393	107,118	81.4	24,505	20,189	—10,106	—13,611
	9 mos.	262	984,395	56,865	1,087,247	209,706	171,766	52,591	464,847	68,771	968,289	89.1	118,958	80,542	—197,872	—104,108
St. Louis Southwestern Lines	Sept.	1,913	1,231,194	26,805	1,342,652	130,359	191,469	78,810	414,708	76,954	898,271	66.9	444,381	353,151	248,840	92,407
	9 mos.	1,913	12,516,887	349,351	13,718,941	1,576,502	2,001,068	847,858	4,627,319	732,842	9,838,478	71.7	3,880,463	3,072,760	1,709,567	1,777,368
San Diego & Arizona	Sept.	155	22,520	10,536	36,417	10,710	14,690	2,925	18,133	6,410	53,903	148.0	—17,486	—21,987	—18,974	—10,197
	9 mos.	155	484,765	123,695	627,496	120,777	130,474	30,066	197,922	62,985	551,945	88.0	75,551	28,642	45,455	159,835
Seaboard Air Line	Sept.	4,478	2,209,624	222,912	2,771,324	454,638	655,654	171,016	1,116,517	171,790	2,572,406	92.8	198,918	—4,232	4,956	407,904
	9 mos.	4,480	26,697,900	3,418,488	33,357,970	5,388,206	6,449,274	1,601,778	12,309,940	1,585,669	27,613,779	82.8	5,744,191	3,126,824	2,469,505	4,527,110
Southern Ry.	Sept.	6,730	6,177,208	975,132	7,803,235	1,234,266	1,576,691	191,288	2,885,214	306,951	6,250,684	80.1	1,552,551	918,990	772,291	2,061,066
	9 mos.	6,730	59,699,269	9,771,833	75,537,525	11,723,890	15,667,988	1,945,412	28,541,643	3,048,912	61,477,420	81.4	14,060,105	8,242,459	6,435,832	14,034,293
Alabama Great Southern	Sept.	315	407,662	63,366	507,050	102,566	122,519	15,076	169,390	19,344	433,282	85.5	73,768	32,522	37,677	96,132
	9 mos.	315	3,803,969	630,005	4,786,160	977,566	1,154,130	145,665	1,718,805	194,485	4,230,307	88.4	555,853	173,120	275,704	867,449
Cinn., New Orleans & Texas Pac.	Sept.	338	882,176	92,266	1,039,648	202,244	267,950	32,660	316,515	48,850	873,342	84.0	166,306	105,451	131,025	335,521
	9 mos.	338	9,728,774	1,096,474	11,524,967	2,090,180	2,782,916	312,342	3,475,225	481,509	9,201,164	79.8	2,323,803	1,658,665	1,645,499	2,679,380

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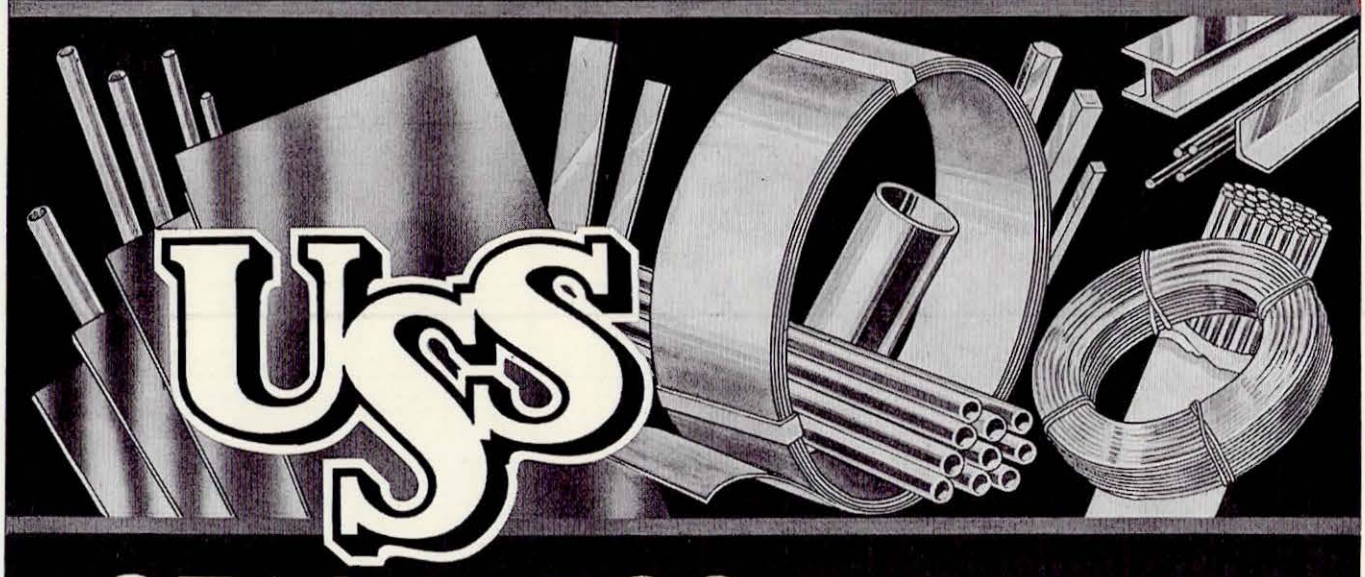
MODERN STEELS *for* MODERN USES



STAINLESS AND HEAT RESISTING ALLOY STEELS

ONLY a few years ago the terms "STAINLESS" and "RUSTLESS" could not be used as descriptive of the properties of ferrous metals. Scientific research and modern metallurgy have brought about a new order of things by placing at the disposal of architects, engineers, technologists and manufacturers a series of alloy steels to which such adjectives may now be very properly applied. Both the industries and the arts are daily taking advantage of these metals for hundreds of useful applications.

Correspondence is invited and your inquiries will receive careful attention by any of the five subsidiary companies of the United States Steel Corporation listed below:

AMERICAN SHEET AND TIN PLATE COMPANY, Pittsburgh
Sheets and Light Plates

AMERICAN STEEL & WIRE COMPANY, Chicago
Cold Rolled Strip Steel, Wire and Wire Products

CARNEGIE STEEL COMPANY, Pittsburgh
Bars, Plates, Shapes, Special and Semi-Finished Products

ILLINOIS STEEL COMPANY, Chicago
Bars, Plates, Shapes, Special and Semi-Finished Products

NATIONAL TUBE COMPANY, Pittsburgh
Pipe and Tubular Products

Pacific Coast Distributors: COLUMBIA STEEL COMPANY, Russ Building, San Francisco
Export Distributors: U. S. STEEL PRODUCTS COMPANY, 30 Church Street, New York City

Typical Uses:

¶ **AUTOMOTIVE and AERONAUTIC**—For radiator shells, hub caps, lamps, bumpers, moldings, polished parts and fittings, hardware and trim, airplane parts and instruments.

¶ **MANUFACTURING and INDUSTRIAL**—Machinery and furnace parts, dampers, fans, preheaters, pumps, conveyors, turbine blades, nozzles, plungers, and machinery specialties.

¶ **CHEMICAL**—Vats, tanks, stills, digesters, condensers, retorts, paper and pulp manufacturing equipment, circulation systems, and laboratory apparatus.

¶ **OIL REFINING**—Bubble caps, still tubes, linings, heat exchangers, ducts, containers, tanks, agitators, and other refining equipment.

¶ **FOOD HANDLING**—Pasteurizers, tables, hospital and hotel kitchen equipment, restaurant fixtures, cafeteria trays, food preserving and dairy machinery and accessories, ice cream and milk containers and utensils.

¶ **ARCHITECTURAL**—Structural members and supports, hinges and hardware, decorative metal embellishments, flat surface facings, moldings, doors, grilles, panels, and ornamental work.

¶ **HOME APPLIANCES**—Kitchen equipment, cooking and canning utensils, furniture, cabinets, electrical appliances, sinks, plumbing fittings, stoves, ranges, and tableware.

¶ **MISCELLANEOUS**—Packing house equipment, soda fountain counters and fixtures, display cases, humidors, handles, hooks, trays, golf clubs, skates, switch boards, metallic mirrors, laundry machinery, tank cars, railway car parts and fittings, and many other uses where beauty and resistance to corrosion are important factors.

USS Chromium-Nickel Alloy Steels are produced under licenses of the Chemical Foundation, Inc., New York; and of Fried. Krupp A. G. of Germany.

CHROMIUM-ALLOY STEELS *Ferritic*	CHROMIUM-NICKEL STEELS *Austenitic*
USS – – 12	USS – 18-8
USS – – 17	USS – 18-12
USS – – 27	USS – 25-12

Revenues and Expenses of Railways

MONTH OF SEPTEMBER AND NINE MONTHS OF CALENDAR YEAR 1931—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of: Way and structures.	Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income. 1930.
Georgia Southern & Florida	Sept.	397	$145,332	$22,075	$184,463	$49,975	$53,278	$1,588	$70,456	$2,461	$180,250	97.7	$4,213	—$17,687	—$4,538	$34,508
	9 mos.	397	1,697,924	406,284	2,287,585	493,351	544,631	18,344	826,170	24,338	1,944,964	85.0	342,621	157,927	153,810	288,321
New Orleans & Northeastern	Sept.	204	205,769	33,037	255,277	45,891	54,372	10,548	88,815	12,702	214,810	84.1	40,467	2,004	—15,519	25,512
	9 mos.	204	1,911,331	315,991	2,401,248	445,908	564,347	86,462	916,800	124,780	2,160,288	90.0	240,960	—111,538	—299,311	179,566
Northern Alabama	Sept.	110	49,605	1,157	52,623	17,288	2,123	1,108	17,805	2,637	40,874	77.7	11,749	6,220	—7,321	436
	9 mos.	110	472,962	16,926	508,539	140,700	21,583	14,732	194,283	24,850	396,035	77.9	112,504	62,731	—66,067	21,331
Southern Pacific	Sept.	9,114	9,049,065	2,126,096	12,398,910	1,300,835	1,743,308	342,928	4,261,805	573,289	8,490,023	68.5	3,908,887	2,748,698	2,372,667	4,603,043
	9 mos.	9,122	82,555,061	21,417,585	114,344,788	13,639,769	19,023,517	3,234,764	40,346,550	5,402,834	83,893,685	73.4	30,451,103	19,963,020	16,254,966	25,882,169
So. Pacific Steamship Lines	Sept.	....	443,934	46,722	513,036	22,829	137,365	20,140	468,372	30,256	618,962	120.6	—105,926	—107,058	—107,190	1,678
	9 mos.	....	4,106,936	407,251	4,824,561	182,930	1,303,951	182,142	3,630,744	286,511	5,586,278	115.8	—761,717	—773,738	—774,611	—345,168
Texas & New Orleans	Sept.	4,703	3,057,780	389,456	3,868,376	578,348	772,075	139,494	1,289,197	221,172	2,949,640	76.3	918,736	652,341	437,926	1,464,333
	9 mos.	4,701	27,804,276	4,369,394	35,891,006	5,657,089	6,826,321	1,420,583	12,790,116	2,092,806	28,914,138	80.6	6,976,868	4,603,865	2,357,794	5,502,858
Spokane, Portland & Seattle	Sept.	554	469,716	61,001	579,225	69,839	93,931	11,730	177,888	23,427	378,645	65.4	200,580	112,318	93,145	191,551
	9 mos.	554	3,855,349	510,787	4,795,069	553,542	710,798	106,076	1,539,441	207,505	3,131,133	65.3	1,663,936	881,022	803,070	995,383
Tennessee Central	Sept.	295	196,475	5,626	212,703	35,027	33,007	8,110	76,427	12,454	164,913	77.5	47,790	42,345	27,747	47,460
	9 mos.	295	1,856,120	69,974	2,019,376	389,350	330,252	76,072	742,065	121,948	1,656,262	82.0	363,114	313,023	172,302	280,943
Terminal R. R. Assn. of St. Louis	Sept.	55	.....	.....	604,299	63,815	47,862	4,491	291,305	20,529	430,756	71.3	173,543	108,383	178,474	195,177
	9 mos.	55	.....	.....	6,113,324	804,485	579,333	35,275	2,956,537	201,154	4,603,334	75.3	1,510,090	711,229	1,392,433	1,835,791
Texas & Pacific	Sept.	1,950	1,615,175	251,367	2,124,550	253,312	385,988	75,705	701,569	112,047	1,543,175	72.6	581,375	456,876	334,466	652,095
	9 mos.	1,951	18,673,896	2,579,824	23,224,463	2,765,786	3,808,563	715,717	7,335,378	1,039,074	15,812,106	68.1	7,412,357	6,162,357	4,425,402	5,340,652
Texas Mexican	Sept.	162	42,601	1,533	51,104	11,723	14,137	3,125	28,314	7,043	64,169	125.6	—13,065	—18,090	—23,400	15,897
	9 mos.	162	579,394	15,411	693,791	137,343	137,503	30,375	322,717	67,909	691,487	99.7	2,304	—42,859	—94,935	27,075
Toledo, Peoria & Western	Sept.	239	142,425	57	145,189	33,329	13,156	14,708	45,723	9,784	117,499	80.9	27,700	23,400	14,976	46,433
	9 mos.	239	1,231,436	881	1,257,314	243,690	118,790	132,435	436,315	82,524	1,013,754	80.6	243,560	200,174	133,081	202,533
Toledo Terminal	Sept.	28	.....	.....	72,293	7,272	12,868	566	29,312	4,659	54,677	75.6	17,616	2,172	23,109	32,654
	9 mos.	28	.....	.....	769,998	118,748	121,105	5,206	323,526	44,146	612,670	79.6	157,328	27,354	244,491	212,234
Ulster & Delaware	Sept.	128	30,103	12,840	80,031	15,812	10,635	1,017	42,853	3,185	73,502	91.8	6,549	1,049	—1,674	—7,881
	9 mos.	128	272,755	107,462	717,193	139,073	107,058	10,056	363,397	33,453	653,937	91.2	63,256	9,143	—13,970	22,129
Union R. R. of Penna.	Sept.	45	.....	.....	396,128	54,578	129,730	147	159,787	14,633	358,875	90.6	37,253	31,053	76,146	305,373
	9 mos.	45	.....	.....	4,016,520	680,017	1,249,873	1,427	1,874,471	129,070	3,934,817	98.0	81,703	—3,475	458,248	2,089,314
Union Pacific	Sept.	3,768	6,895,977	832,162	8,452,238	522,896	1,419,332	131,959	2,370,410	330,654	4,837,557	57.2	3,614,681	3,215,693	2,713,458	3,622,061
	9 mos.	3,765	53,775,785	7,515,211	67,525,414	7,621,436	14,724,328	1,522,607	19,948,927	3,087,319	48,087,009	71.2	19,438,405	14,108,330	11,478,395	16,465,319
Oregon Short Line	Sept.	2,531	2,317,193	185,813	2,682,781	273,718	315,314	47,250	803,764	121,799	1,595,857	59.5	1,086,924	832,511	706,755	1,252,030
	9 mos.	2,531	17,179,073	1,733,154	20,559,384	3,453,656	3,363,263	478,228	6,568,297	1,132,922	15,416,670	75.0	5,142,714	2,625,428	1,764,194	3,394,157
Oregon-Wash. R. R. & Nav. Co.	Sept.	2,337	1,445,858	151,876	1,778,880	204,010	201,733	63,557	643,785	114,566	1,241,920	69.8	536,960	352,839	228,889	386,002
	9 mos.	2,337	12,095,950	1,344,293	15,079,539	2,774,931	2,219,591	637,897	5,940,141	1,103,530	12,828,917	85.1	2,250,622	596,211	—356,429	672,057
Los Angeles & Salt Lake	Sept.	1,249	1,261,832	242,728	1,660,537	196,791	217,416	58,373	504,174	79,772	1,110,312	66.9	550,215	406,075	269,280	217,432
	9 mos.	1,247	10,862,829	2,332,661	14,546,965	2,417,330	2,310,681	649,332	4,730,425	763,867	11,361,475	78.1	3,185,490	1,857,937	715,929	1,664,949
St. Joseph & Grand Island	Sept.	258	247,546	4,092	261,729	29,857	33,165	3,182	87,835	16,075	170,305	65.3	90,424	77,615	47,186	78,981
	9 mos.	258	2,235,233	42,929	2,377,473	469,048	304,748	30,916	786,426	157,152	1,761,989	74.1	615,484	478,240	228,788	456,957
Utah	Sept.	111	132,627	.....	133,326	16,856	22,506	377	26,687	7,215	73,641	55.2	59,685	47,738	29,482	43,509
	9 mos.	111	836,518	36	840,897	126,372	244,623	3,336	201,618	51,368	626,361	74.5	214,536	146,611	39,863	74,741
Virginian	Sept.	601	1,312,293	11,587	1,392,464	198,644	202,908	17,498	264,061	34,001	624,047	44.8	768,417	593,417	684,630	686,519
	9 mos.	589	10,802,209	127,715	11,586,106	1,160,305	2,094,740	142,254	2,519,780	291,707	6,205,778	53.6	5,380,328	3,980,257	4,639,877	5,328,533
Wabash	Sept.	2,523	3,235,999	349,329	3,875,101	602,831	737,357	197,605	1,781,045	238,000	3,585,464	92.5	289,637	59,241	—333,657	749,380
	9 mos.	2,523	32,772,202	3,138,718	38,717,735	3,949,756	6,922,703	1,757,897	17,181,331	2,076,294	32,084,412	82.9	6,633,323	4,700,540	1,015,958	5,426,050
Ann Arbor	Sept.	293	283,539	7,054	305,640	38,654	61,931	14,808	146,278	15,337	277,177	90.7	28,463	6,194	—14,840	72,147
	9 mos.	293	2,911,205	56,347	3,085,339	296,595	626,730	135,507	1,433,688	148,513	2,642,133	85.6	443,206	244,904	39,983	399,433
Western Maryland	Sept.	891	1,090,650	9,099	1,159,838	150,641	193,411	40,839	316,811	39,755	746,832	64.4	413,006	333,006	340,123	480,092
	9 mos.	893	10,604,580	99,735	11,273,843	1,562,153	1,989,426	395,404	3,073,930	375,204	7,432,535	65.9	3,841,308	3,151,308	3,209,460	3,997,144
Western Pacific	Sept.	1,051	1,058,859	68,522	1,247,633	118,158	163,245	57,984	451,165	43,461	873,993	70.1	373,640	279,577	239,523	686,683
	9 mos.	1,051	8,105,152	657,343	9,554,625	1,749,281	1,746,954	611,431	4,091,981	433,025	8,836,056	92.5	718,569	—117,591	—93,510	717,646
Wheeling & Lake Erie	Sept.	511	942,531	7,444	1,021,225	146,897	240,146	34,877	339,367	40,414	802,123	78.5	219,102	121,184	121,321	182,533
	9 mos.	511	8,605,135	85,565	9,267,068	1,156,645	2,377,348	310,515	3,043,160	365,203	7,261,376	78.4	2,005,692	1,079,339	1,038,807	2,740,252
Wichita Falls & Southern	Sept.	203	51,461	45	53,865	10,459	7,232	2,123	15,393	2,801	37,608	69.82	16,257	12,052	8,567	12,670
	9 mos.	203	496,073	841	514,024	98,877	75,223	21,646	162,151	31,161	385,259	74.95	128,765	89,703	52,487	99,430

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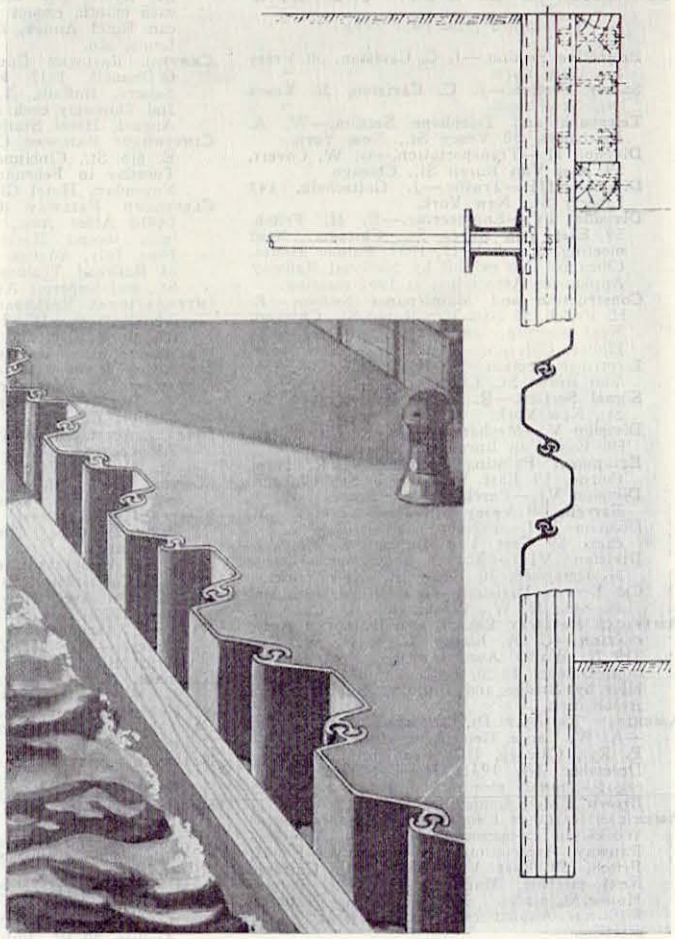
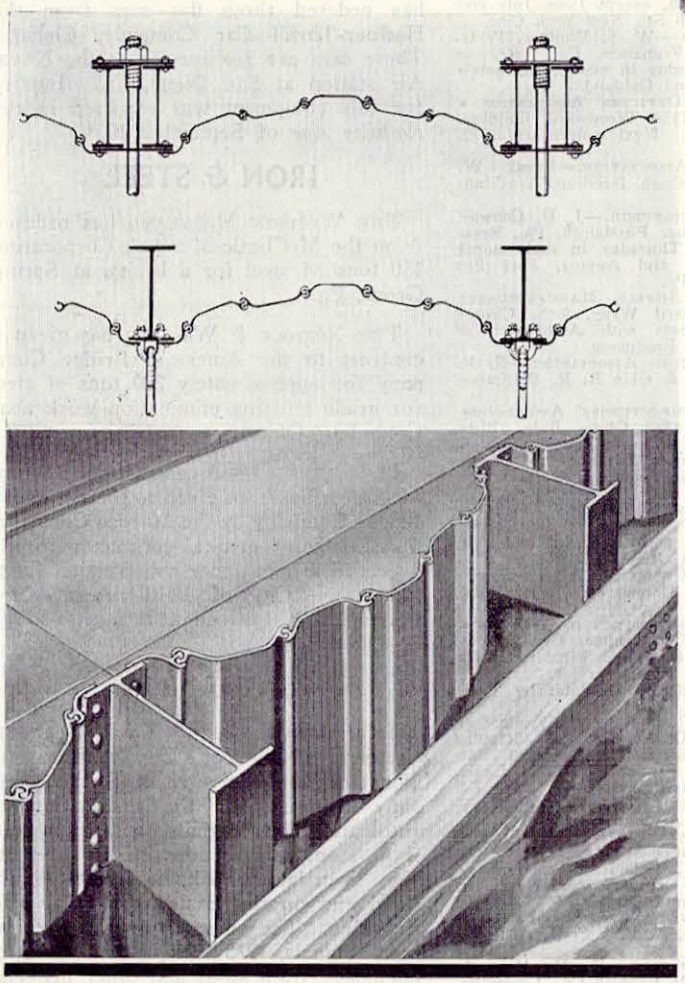
Modern Steel Wharves

Three efficient and economical types of modern wharf and bulkhead construction are illustrated herewith. On the right is shown the type for all depths of channel up to 25 feet. Carnegie Arch-Web Steel Sheet Piling has proved particularly efficient for this construction. A number of arch-web sections of varying weights and depths are available to meet the required strength for this range of depths. Section M110 is illustrated, with a driving width of 16", depth of 6" and a section modulus of 15.26 in.^{3} per foot of wall.





On the left are shown two types of construction for channels deeper than 25 feet. By varying the weight of the C B Sections and the spacing of the master piles, a wharf for any depth of channel and any surcharge load can be constructed. No waling is necessary in this construction.

Numerous installations have definitely proved the efficiency and economy of these three types. Carnegie Engineers are ready to consult with you at any time.

Carnegie Steel Company, Pittsburgh
Subsidiary of United States Steel Corporation 160

Carnegie Steel Sheet Piling

Meetings & Conventions

(Continued from page 721)

Protective Section.—J. C. Caviston, 30 Vesey St., New York.
Safety Section.—J. C. Caviston, 30 Vesey St., New York.
Telegraph and Telephone Section.—W. A. Fairbanks, 30 Vesey St., New York.
Division II.—Transportation.—G. W. Covert, 59 East Van Buren St., Chicago.
Division III.—Traffic.—J. Gottschalk, 143 Liberty St., New York.
Division IV.—Engineering.—E. H. Fritch, 59 East Van Buren St., Chicago. Next meeting, March 15-17, 1932, Palmer House, Chicago. No exhibit by National Railway Appliances Association at 1932 meeting.
Construction and Maintenance Section.—E. H. Fritch, 59 East Van Buren St., Chicago. Next meeting, March 15-17, 1932, Palmer House, Chicago.
Electrical Section—E. H. Fritch, 59 East Van Buren St., Chicago.
Signal Section.—R. H. C. Balliet, 30 Vesey St., New York.
Division V.—Mechanical.—V. R. Hawthorne, 59, East Van Buren St., Chicago.
Equipment Painting Section.—V. R. Hawthorne, 59 East Van Buren St., Chicago.
Division VI.—Purchases and Stores.—W. J. Farrell, 30 Vesey St., New York, N. Y.
Division VII.—Freight Claims.—Lewis Pilcher, 59 East Van Buren St., Chicago.
Division VIII.—Motor Transport.—George M. Campbell, 30 Vesey St., New York.
Car Service Division.—C. A. Buch, 17th and H. Sts., N. W., Washington, D. C.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W. Ry., 319 N. Waller Ave., Chicago. Next convention, October 18-20, 1932, Toronto, Ont. Exhibit by Bridge and Building Supply Men's Association.

AMERICAN RAILWAY DEVELOPMENT ASSOCIATION.—A. W. Large, Gen. Agri. Agt., C. R. I. & P. Ry., Chicago, Ill. Semi-annual meeting, December 3-4, 1931, Hotel Sherman, Chicago; annual meeting, June 15-17, 1932, Brown Hotel, Louisville, Ky.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—Works in co-operation with the American Railway Association, Division IV.—E. H. Fritch, 59 East Van Buren St., Chicago. Next meeting, March 15-17, 1932, Palmer House, Chicago. No exhibit by National Railway Appliances Association at 1932 meeting.

AMERICAN RAILWAY MAGAZINE EDITORS ASSOCIATION.—Miss E. Kramer, M-K-T Employes Magazine, St. Louis, Mo. Next convention, April, 1932, San Antonio, Tex.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—G. G. Macina, C., M., St. P. & P. R. R., 11402 Calumet Ave., Chicago. Exhibit by Supply Association of the American Railway Tool Foremen's Association.—E. E. Caswell, Union Twist Drill Co., 11 S. Clinton St., Chicago.

AMERICAN SHORT LINE RAILROAD ASSOCIATION.—R. E. Schindler, Union Trust Bldg., Washington, D. C.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Railroad Division, Paul D. Mallay, Johns-Manville Corp., 292 Madison Ave., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—H. L. Dawson, 1104 Chandler Building, Washington, D. C. Next meeting, January 26-28, 1932, Hotel Jefferson, St. Louis, Mo.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—H. D. Morris, District Claim Agent, Northern Pacific Ry., St. Paul, Minn. Annual convention, May, 1932, Louisville, Ky.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Station, Chicago. Exhibit by Railway Electrical Supply Manufacturers' Association.

ASSOCIATION OF RAILWAY EXECUTIVES.—Stanley J. Strong, Transportation Building, Washington, D. C.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—S. A. Baber, High Grade Manufacturing Co., 10418 St. Clair Ave., Cleveland, Ohio. Meets with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—C. R. Crook, 2276 Wilson Ave., N. D. G., Montreal, Que. Regular meetings, 2nd Monday in each month, except June, July and August, Windsor Hotel, Montreal, Que.

CAR DEPARTMENT OFFICERS ASSOCIATION.—A. S. Sternberg, M. C. B. Belt Ry. of Chicago, 7926 South Morgan Street, Chicago.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—G. K. Oliver, 2514 W. 55th St., Chicago. Regular meetings, 2nd Monday in month, except June, July, and August, Great Northern Hotel, Chicago.

CAR FOREMEN'S ASSOCIATION OF LOS ANGELES.—J. W. Krause, Room 299, 610 So. Main St., Los Angeles, Cal. Regular meetings, 2nd Monday of each month, except July, August and September, Room 299, 610 So. Main St., Los Angeles.

CAR FOREMEN'S ASSOCIATION OF ST. LOUIS, MO.—F. G. Wiegman, 720 N. 23rd St., East St. Louis, Ill. Meetings first Tuesday of each month, except July and August, American Hotel Annex, 6th and Market Sts., St. Louis, Mo.

CENTRAL RAILWAY CLUB OF BUFFALO.—T. J. O'Donnell, 1817 Hotel Statler, McKinley Square, Buffalo, N. Y. Regular meetings, 2nd Thursday each month, except June, July, August, Hotel Statler, Buffalo, N. Y.

CINCINNATI RAILWAY CLUB.—D. R. Boyd, 453 E. 6th St., Cincinnati, Ohio. Meetings 2nd Tuesday in February, May, September and November, Hotel Gibson, Cincinnati, O.

CLEVELAND RAILWAY CLUB.—F. L. Frericks, 14416 Alder Ave., Cleveland, Ohio. Meetings, second Monday each month, except June, July, August, Auditorium, Brotherhood of Railroad Trainmen's Building, West 9th St., and Superior Ave., Cleveland.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—W. J. Mayer, Michigan Central R. R., Detroit, Mich.

INTERNATIONAL RAILWAY CONGRESS.—Cairo, Egypt, January 10-16, 1933.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. T. Winkless, Room 700 La Salle Street Station, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1061 W. Wabasha St., Winona, Minn.

MASTER BOILER MAKERS ASSOCIATION.—A. F. Stiglmeier, 29 Parkwood St., Albany, N. Y.

MASTER CAR BUILDERS' AND SUPERVISORS' ASSOCIATION.—(See Car Department Officers' Association.)

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS.—James B. Walker, 270 Madison Ave., New York. Annual convention, 1932, Hot Springs, Ark.

NATIONAL ASSOCIATION OF RAILROAD TIE PRODUCERS.—Roy M. Edmonds, 1252 Syndicate Trust Bldg., St. Louis, Mo.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—C. W. Kelly, 1014 South Michigan Ave., Chicago. Annual meeting, March 14, 1932, 1014 South Michigan Ave., Chicago. No exhibit at A. R. E. A. convention in 1932.

NATIONAL SAFETY COUNCIL.—Steam Railroad Section: J. L. Walsh, Supt. Safety, M.-K.-T. R. R., Dallas, Tex.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2nd Tuesday in month, except June, July, August and September, Copley Plaza Hotel, Boston, Mass.

NEW YORK RAILROAD CLUB.—D. I. McKay, 26 Cortlandt St., New York. Regular meetings, 3rd Friday in month, except June, July and August, 29 W. 39th St., New York City.

PACIFIC RAILWAY CLUB.—W. S. Wollner, P. O. Box, 3275, San Francisco, Cal. Regular meetings 2nd Thursday in month, alternately in San Francisco and Oakland.

RAILWAY ACCOUNTING OFFICERS' ASSOCIATION.—E. R. Woodson, 1124 Woodward Building, Washington, D. C. Next convention, 1932, Buffalo, N. Y.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 1112 Shoreham Building, Washington, D. C.

RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, 1841 Oliver Building, Pittsburgh, Pa., Regular meetings, 4th Thursday in each month except June, July and August, Fort Pitt Hotel, Pittsburgh, Pa.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—Edward Wray, 9 S. Clinton St., Chicago. Meets with Association of Railway Electrical Engineers.

RAILWAY FIRE PROTECTION ASSOCIATION.—R. R. Hackett, Baltimore & Ohio R. R. Baltimore, Md.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 1841 Oliver Bldg., Pittsburgh, Pa. Meets with Mechanical Division, Purchases and Stores Division and Motor Transport Division. American Railway Association.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 30 Church St., New York. Meets with Telegraph and Telephone Section of A. R. A. Division 1.

RAILWAY TREASURY OFFICERS' ASSOCIATION.—L. W. Cox, 1217 Commercial Trust Bldg., Philadelphia, Pa.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—T. F. Donahoe, Gen. Supvr. Road, Baltimore & Ohio, Pittsburgh, Pa. Next convention, September 20-22, 1932, Hotel Stevens, Chicago. Exhibit by Track Supply Association.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal Drawer 24, M. P. O., St. Louis, Mo. Regular meetings, 2nd Friday in month, except June, July and August. Statler Hotel, St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, West Nyack (Rockland Co.), N. Y. Meets with A. R. A. Signal Section.

SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. T. Miller, 4 Hunter St., S.E., Atlanta, Ga. Regular meetings, 3rd Thursday in January, March, May, July, September and November. Ansley Hotel, Atlanta.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—R. G. Parks, A. B. & C. Ry., Atlanta, Ga.

SUPPLY MEN'S ASSOCIATION.—E. H. Hancock, Treasurer, Louisville Varnish Co., Louisville, Ky. Meets with A. R. A. Div. V. Equipment Painting Section.

TORONTO RAILWAY CLUB.—J. A. Murphy, 1405 Canadian National Express Building, Toronto 2, Regular meetings 1st Monday of each month, except June, July and August, Royal York Hotel, Toronto, Ont.

TRACK SUPPLY ASSOCIATION.—L. C. Ryan, Oxweld Railroad Service Co., Carbon & Carbide Building, Chicago. Meets with Roadmasters and Maintenance of Way Association.

TRAVELING ENGINEERS' ASSOCIATION. — W. O. Thompson, 1177 East 98th St., Cleveland, O.

WESTERN RAILWAY CLUB.—J. H. Nash, Dri-Steam Valve Sales Corp., 122 S. Michigan Ave., Chicago. Regular meetings 3rd Monday each month, except June, July, August and September, Hotel Sherman, Chicago.

Equipment and Supplies

LOCOMOTIVES

THE ALASKA RAILROAD is inquiring for one locomotive of the 4-8-2 type.

THE NORFOLK & WESTERN will build 10 new locomotive tenders of 22,000 gal. capacity, at its Roanoke, Va., shops.

THE DELAWARE, LACKAWANNA & WESTERN is inquiring for 12 high-speed freight locomotives of the 4-8-4, Pocono type.

FREIGHT CARS

THE NORFOLK & WESTERN will make extensive repairs to 500 steel coal cars of 57½ tons capacity at its Roanoke, Va., shops.

THE UNITED STATES NAVY DEPARTMENT has ordered three flat cars from the Haffner-Thrall Car Company, Chicago. These cars are for service at the Naval Air station at San Diego, Cal. Inquiry for this equipment was reported in the *Railway Age* of September 19.

IRON & STEEL

THE WESTERN MARYLAND has ordered from the McClintic-Marshall Corporation 150 tons of steel for a bridge at Spring Grove, Pa.

THE NORFOLK & WESTERN has given a contract to the American Bridge Company for approximately 220 tons of steel for grade crossing elimination work near Columbus, Ohio.

PENNSYLVANIA.—A contract for 500 tons of girders has been given to the American Bridge Company by the Maroco Construction Company, general contractor for an overhead bridge under construction jointly by the City of Baltimore and the Pennsylvania Railroad, at Lafayette street, Baltimore.

SIGNALING

THE INTERBOROUGH RAPID TRANSIT COMPANY (New York City) has ordered from the Union Switch & Signal Company material for the installation of automatic block signals, with automatic train stops, on sections of its lines to Van Courtlandt Park, to White Plains Road and on the Eastern Parkway line, Brooklyn. The order includes 136 color-light signals, 275 relays, 110 electro-pneumatic train stops and other material.

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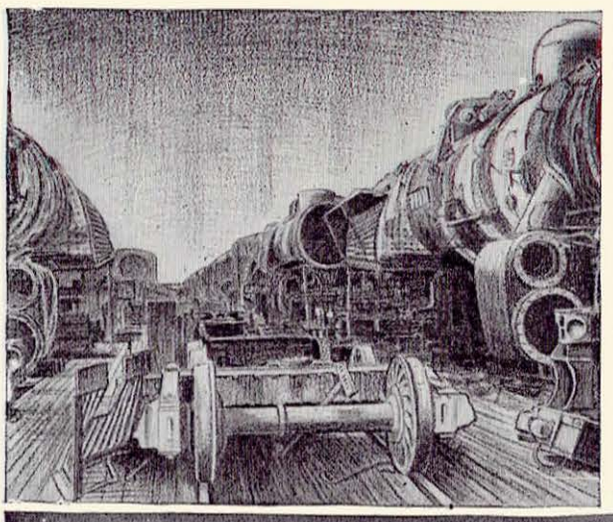


ACATHON STEELS
TRADE MARK

REG. U.S. PAT. OFF.
TONCAN
COPPER
Mo-lyb-den-um
IRON

An Epidemic of Parts Failures *Checked by the "Metal Doctor"*

SPRINGS on the new equipment were failing with appalling frequency. Designs were checked. Manufacture was looked to. And yet, the failures continued.

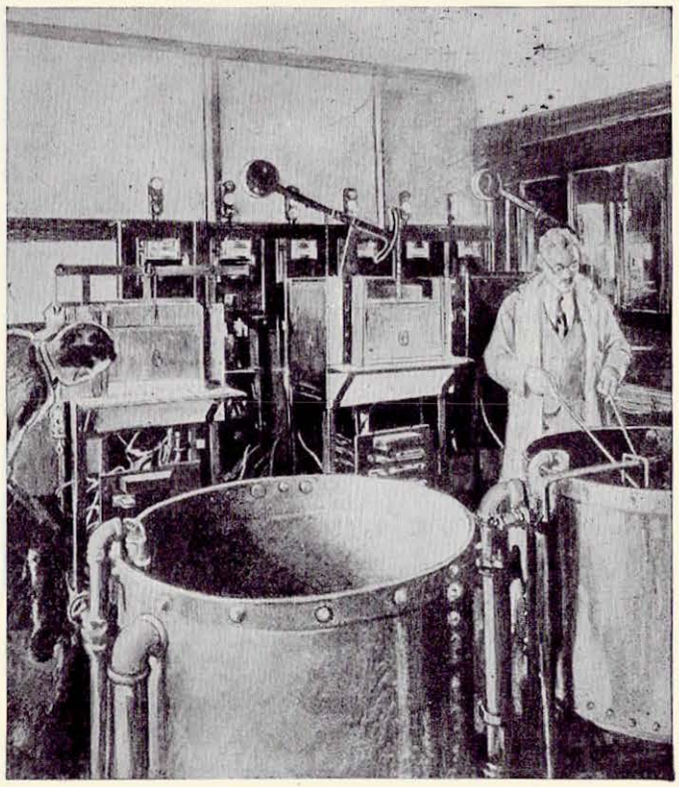
■ Republic metallurgists were appealed to. Conditions were analyzed; metallurgical examinations made, and a special alloy steel was chosen to remedy the trouble.

■ No longer is steel just steel. Alloys have given the metallurgist a multitude of steels with varying qualities with which to meet varying conditions of service.

■ For all these conditions, metallurgists of the Republic Steel Corporation have developed in the country's largest metallurgical research laboratories special alloy steels and irons.

■ These better materials are proving of the greatest assistance in controlling the rising tide of maintenance.

■ Where materials are a problem, consult the Republic Steel Corporation.



Central Alloy Division

REPUBLIC STEEL CORPORATION

Massillon, Ohio

Supply Trade

A. A. Probeck has been appointed sales manager of the **Federal Machine & Welder Company**, Warren, Ohio.

William P. Witherow, vice-president of the **Republic Steel Corporation**, has resigned to devote his time to private interests.

L. W. Erickson has been appointed district representative for the Milwaukee and Wisconsin territory of the **Foote Brothers Gear & Machine Company**, Chicago, to succeed **E. L. Parsons.**

Ralph W. Payne has been appointed district railroad representative in the southeastern states, with office at 613 Fifteenth street, N. W., Washington, D. C., of the **American Hoist & Derrick Company**, St. Paul, Minn.

Chatard & Norris, 218 Water street, Baltimore, Md., have been appointed exclusive representatives for the eastern part of Maryland and the District of Columbia, of the **Homestead Valve Manufacturing Company, Inc.**, Coraopolis, Pa.

A. W. Thompson, vice-president since 1928, and for the past five years Pacific coast manager in charge of sales for **Fairbanks, Morse & Company**, Chicago, has been appointed vice-president in charge of manufacturing. He succeeds **W. C. Heath**, who resigned on November 1.

The Railroad Supply Company, Chicago, filed a voluntary petition in bankruptcy on October 27, and on the same day the Federal Court appointed **Fred E. Hummel**, 105 W. Adams street, Chicago, receiver. The receiver has announced that he will continue to operate the business, filling all orders for repairs and new supplies.

Walter S. Lacher, western engineering editor of the *Railway Age*, has been promoted to engineering editor to take over a portion of the duties heretofore handled by **Elmer T. Howson**, western editor, whose election as vice-president and director was noted in last week's issue. Mr. Howson, who retains the position of western editor, will continue to exercise general supervision over engineering matters as heretofore.

Robert S. Binkerd, formerly vice-chairman of the Eastern Railroads' Committee on Public Relations, who has been appointed director of sales of the **Baldwin Locomotive Works**, with headquarters at Philadelphia, Pa., was born on November 7, 1882, at Dayton, Ohio, and was graduated from Yale University in 1904. He then served for four years as secretary of the Municipal Voters' League at Buffalo, N. Y. In 1908 and 1909 he was secretary of the Citizens' Union in New York and served in the same capacity with the City Club of New York from 1909 to 1917. During the latter year he became advisor to the Fusion Committee in the New York City municipal election, and later in the same year, joined the organization of the Association of Railway Executives in New York as assistant to the chairman, in which capacity he was closely identified with the association's public relations work. In 1922 he was appointed vice-

Robert S. Binkerd

chairman of the Committee on Public Relations of the Eastern Railroads and resigned in September, 1927, to become a general partner in the New York stock exchange firm of James H. Oliphant & Co. He later forsook this connection, but has continued up to the present his active association with financial enterprises in New York.

OBITUARY

George A. Hart, manager of the Melrose Park works of the National Malleable & Steel Castings Co., Cleveland, Ohio, died on October 19, at Maywood, Ill.

Robert H. Ripley, senior vice-president of the American Steel Foundries and chairman of the board of the General Steel Castings Corporation, died on November 4 at Chicago.

Robert E. Keough, western representative, railway appliance division of the American Fork & Hoe Co., with headquarters at Chicago, died on October 29 from a complication of ailments. He was born in Denver, Ill., and was educated at the University of Illinois. He entered railway service in 1892 as a section laborer on the Chicago, Peoria & St. Louis (now a part of the Alton & Eastern), at Bath, Ill. During the following five years, he was employed by the Chicago & Illinois Midland, the Chicago, Springfield & St. Louis, and the Litchfield & Madison. In 1897, he was appointed section foreman of the St. Louis, Iron Mountain & Southern (now the Missouri Pacific) at Gurdon, Ark., and in the following year section foreman for the St. Louis, Peoria & Northern (now the Chicago & Alton) at New Holland, Ill. In 1900, he was made extra gang foreman of the St. Louis, Memphis & Southeastern (now the St. Louis-San Francisco), and in 1902, section foreman on the Chicago & Alton at Pekin, Ill. He entered the University of Illinois Academy in 1903 and continued there until 1907, doing extra gang work for the Chicago & Eastern Illinois, the St. Louis Southwestern and the Illinois Central during summer vacations. In 1907, he served as general foreman on second track work for the Chicago, Burlington & Quincy, and in the following year was appointed roadmaster at Hannibal, Mo., which position he held until 1910, when he was transferred to Aurora, Ill. From 1913 to 1916, he served as trainmaster and roadmaster. In the latter year he resigned to become assistant engineer of maintenance of way, Eastern Lines, of the Canadian Pacific in Montreal, Que., which position he held until 1926, when he resigned to become western representative of the American Fork & Hoe Co., the position he was holding at the time of his death.

William K. Bixby, who retired as president of the American Car & Foundry Co. in 1905, died in St. Louis, Mo., on October 29, from myocarditis. He was born at Adrian, Mich., on January 2, 1857, and received the degree of master of arts at Amherst College in 1913, and the degree of doctor of law at the University of Missouri in 1907. He entered railway service in 1873 as a baggageman on the International Great Northern at Palestine, Tex., and later was employed in the baggage department of the Houston Union Station and still later, as general baggage agent of the International Great Northern. After he had been with the railroad several years, Mr. Bixby joined the Missouri

Strauss Studio

William K. Bixby

Car & Foundry Co. and after becoming president of this company, played a prominent part in the merger with the Michigan Peninsular Car Company. This merger was the first step in the consolidation of 13 firms which in 1899, formed the American Car & Foundry Co., of which Mr. Bixby was made president. Soon after the consolidation,

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BETTER FIRES

FIREBAR CORPORATION
CLEVELAND OHIO.

he became chairman of the board and in 1905, retired. Since his retirement, he served as one of the receivers of the Wabash from 1909 to 1914, and a director of the St. Louis Union Trust Company and engaged in many civic enterprises. He was a charter member of the Incorporation of the American Red Cross, and had served as honorary president of the Provident Association and Archaeological Society, president of the City Art Museum of St. Louis, president of Washington University, a trustee of the Y. W. C. A. Endowment Fund, and a director of the National Gallery of Arts, Washington, D. C.

Construction

BALTIMORE & OHIO.—A contract amounting to approximately $125,000 for grading required in connection with relocation of this company's main line in the vicinity of Wittmer, Pa., has been awarded to the Vang Construction Company, Cumberland, Md.

BOSTON & MAINE.—This company has awarded to Daniel O'Connell's Sons, Inc., Holyoke, Mass., a contract for the rebuilding, at a cost of $42,682, of bridge No. 5.25 (old B-7), at McKinstry avenue, Chicopee, Mass.

LONG ISLAND.—The Public Service Commission of New York has approved as not excessive a bid of $53,561 submitted by Foley Bros., Inc., New York, for work in connection with the reconstruction of the railroad bridge carrying this company's tracks over Jericho turnpike, Hempstead, Long Island, N. Y.

MISSOURI-KANSAS-TEXAS OF TEXAS.—The Texas State Highway department contemplates the construction of a highway subway to carry the San Antonio-Austin highway under the tracks of this company in the vicinity of Fratt, Tex.

PENNSYLVANIA.—The New York Public Service Commission has designated for elimination the grade crossing of this company's line with the Portville-Carroll county highway, about 1¼ miles south of Portville station, Portville, N. Y. Elimination will be accomplished by carrying the highway under a revised grade of the railroad just north of the present crossing, at an estimated cost of $124,000. In connection with its general improvement program at Baltimore, Md., described in previous issues of *Railway Age*, this railroad, jointly with the City of Baltimore, has awarded to the Maroco Construction Company a contract for the construction of an overhead bridge at Lafayette street.

TEXAS & PACIFIC.—A contract has been awarded to the Christy-Dolph Construction Company, Dallas, Tex., for the construction of a brick warehouse at that point, to cost about $27,000.

WESTERN MARYLAND.—This company has ordered from the McClintic-Marshall Corporation steel, for delivery in eight or ten weeks, for the reconstruction of a five-span bridge at Spring Grove, Pa.

Financial

CENTRAL OF NEW JERSEY.—*Omits Dividend.*—Directors of this company have omitted the usual quarterly dividend of $2—its first omission of a dividend since 1888. It has, however, this year paid three quarterly dividends of $2 and one extra dividend for the same amount. Last year it paid its four regular dividends totaling $8 and two extras of $2 each.

CHICAGO & EASTERN ILLINOIS.—*Notes.*—The Interstate Commerce Commission has authorized this company to pledge and repledge as collateral security for short term notes $5,262,500 of its prior lien mortgage 6 per cent bonds, series A.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—*Trackage Rights.*—The Interstate Commerce Commission has authorized this company to operate under trackage rights over the Northern Pacific from Longview Junction, Wash., to Vader Junction, 24.5 miles, over the line formerly owned by the Longview, Portland & Northern.

GULF, MOBILE & NORTHERN.—*Interlocking Director.*—The Interstate Commerce Commission has authorized E. P. Bracken, executive vice-president of the Chicago, Burlington & Quincy, to serve as a director of the Gulf, Mobile & Northern and the New Orleans Great Northern.

NEW YORK CENTRAL.—*Construction and Trackage Rights.*—The Interstate Commerce Commission has authorized the Michigan Central to construct two short connecting tracks from a point near Burton avenue, Grand Rapids, Mich., to link it up with the Pennsylvania; thence proceeding by trackage rights over the Pennsylvania about one mile; constructing another short connecting track from the Pennsylvania to the line of railroad formerly owned by the Michigan Railroad; thence proceeding from a point about 3 miles south of Grand Rapids northward 7.3 miles to Bridge street in that city. The New York Central is authorized to operate over the entire extension, which will be 8.3 miles long, including trackage rights. This authorization takes the place of one granted by the Commission about a year ago which contemplated operation by the New York Central into Bridge street, Grand Rapids, over the Michigan Railroad, but omitted trackage rights over the Pennsylvania and hence involved more new construction.

Dividends Declared

Bangor & Aroostook.—Common, $.87, quarterly, payable January 1 to holders of record November 30; preferred, $1.75 quarterly, payable January 1 to holders of record November 30.

Delaware & Hudson.—$2.25, quarterly, payable December 21 to holders of record November 27.

Central of New Jersey.—Quarterly dividend omitted.

Average Prices of Stocks and of Bonds

	Nov. 4	Last week	Last year
Average price of 20 representative railway stocks..	45.84	45.49	95.48
Average price of 20 representative railway bonds..	76.38	76.73	94.13

Railway Officers

EXECUTIVE

Robert K. Rochester, general manager of the Eastern region of the Pennsylvania, has been appointed assistant to the vice-president in charge of operation, with headquarters at Philadelphia. Mr. Rochester succeeds **Walter S. Franklin,** who was recently elected president of the Wabash. Mr. Rochester was born on December 7, 1877, at Simcoe, Ont., and received his higher education at Rose Polytechnic Institute, Terre Haute, Ind. He entered railway service on November 10, 1901, and until May 1, 1902, served as assistant engineer maintenance of way of the Michigan division of the Vandalia Railroad (now part of the Pennsylvania). From the latter date until November 1 of the same year he served as acting engineer maintenance of way of the same division and then became engineer maintenance of way, which position he held until June 1, 1905. From that time until May 1, 1909, he was principal assistant engineer of the same road, and was then appointed division engineer of the St. Louis division. He remained there until July 1, 1913, and was then appointed superintendent of the Peoria division, which position he held until April 1, 1914,

Robert K. Rochester

when he became superintendent of the Logansport division of the Pittsburgh, Cincinnati, Chicago & St. Louis (now also part of the Pennsylvania). From January 1, 1917, until February 11, 1918, Mr. Rochester served as superintendent of the Cleveland and Pittsburgh division of the Pennsylvania. From the latter date until January 16, 1919, he was in military service. On January 16, 1919, he became superintendent on special duty in the office of the general manager of the Western lines of the Pennsylvania, which position he held until August 16 of the same year. From that date until March 1, 1920, he was superintendent of the Cleveland and Pitts-

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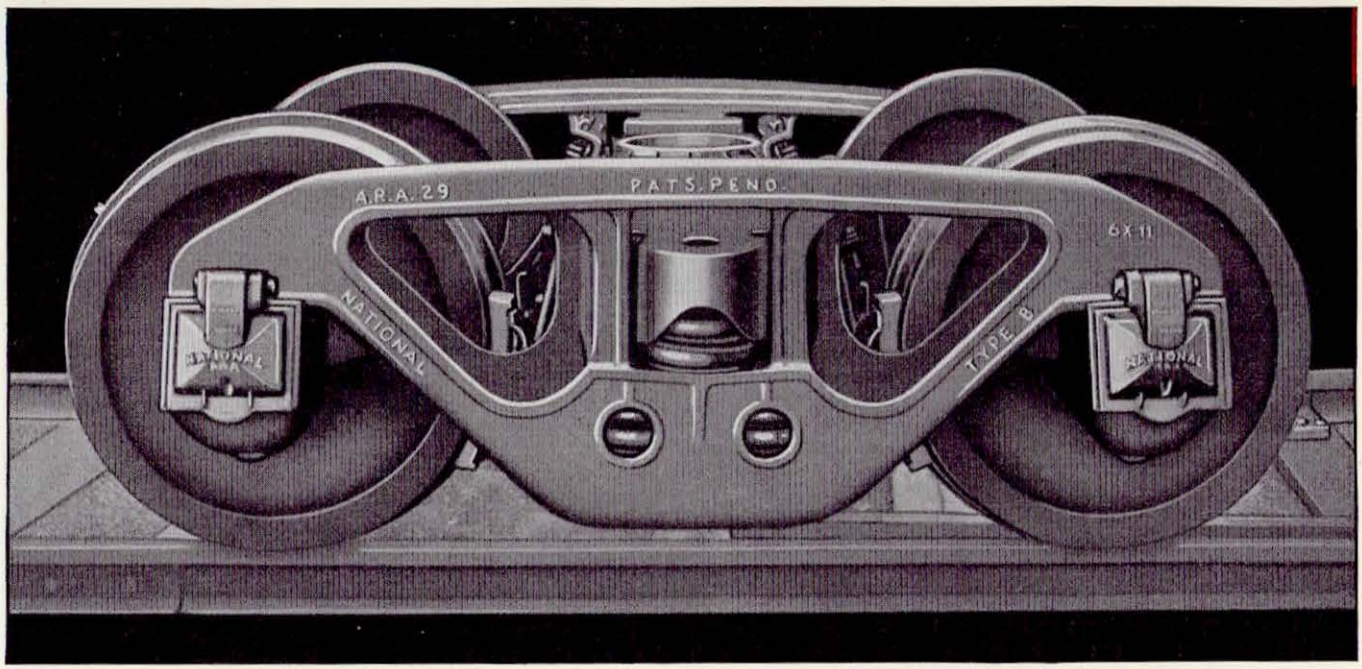
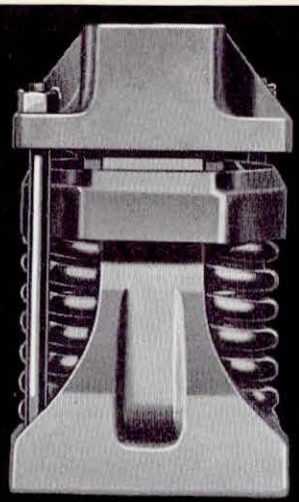
TRUCKS ››› that Speed Train Operation



GREATER STRENGTH FOR MODERN RAILROADING

THE MODERN combination of heavy loads and high speeds demands new standards of quality and performance from every item in freight equipment. ›› National Type B trucks give increased strength per pound of weight—strength well in excess of present-day operating requirements which insures economical and profitable operation.



M17
National Draft Gear
Another contribution by National to profitable freight operation. This gear stands first in the combination of capacity, sturdiness and endurance.

THE NATIONAL MALLEABLE & STEEL CASTINGS CO.
General Offices: CLEVELAND, OHIO

Sales Offices: New York, Philadelphia, Washington, Chicago, St. Louis, San Francisco
Works: Cleveland, Chicago, Indianapolis, Sharon, Pa., Melrose Park, Ill.

NATIONAL
TYPE M&S B TRUCKS

burgh division of the Western lines, and was then appointed general superintendent of the Central Ohio division of the Southwestern region of the Pennsylvania at Columbus, Ohio. In January, 1924, Mr. Rochester was appointed to a similar position on the Northern division at Buffalo, N. Y. In April, 1926, he was transferred in the same capacity to the New Jersey division, and in June, 1927, was appointed assistant general manager at New York. From November, 1927, to July, 1928, Mr. Rochester was general manager of the Long Island Railroad, and on the latter date he was appointed to the same position on the Eastern region of the Pennsylvania, which position he held until his recent appointment as assistant to vice-president, operation.

FINANCIAL, LEGAL AND ACCOUNTING

T. B. Collins, right of way agent of the Oregon-Washington Railroad & Navigation Co., with headquarters at Portland, Ore., has had his duties extended to cover tax matters and has had his title changed to tax and right of way agent. **L. W. Hobbs,** tax agent, has been appointed attorney, with headquarters as before at Portland. **F. J. Betz** has been appointed attorney at Portland, to succeed **O. G. Edwards,** who has resigned.

TRAFFIC

H. S. Rice, commercial agent of the Atlanta, Birmingham & Coast, has been promoted to general agent at Atlanta, Ga., succeeding **P. L. Graves,** deceased. **A. S. Purnell** has been appointed freight traffic agent at Miami, Fla. **R. G. Taylor, Jr.,** has been appointed freight traffic agent at Atlanta.

OPERATING

Effective October 16, the position of general superintendent of the Los Angeles & Salt Lake (unit of the Union Pacific system) was abolished and **W. R. Armstrong** was assigned to other duties.

Effective October 16, the telegraph departments of the New York Central, the Michigan Central, the Cleveland, Cincinnati, Chicago & St. Louis and the Peoria & Eastern, were consolidated, with headquarters at Detroit, Mich., and the following appointments were made: **W. A. Jackson,** superintendent of telegraph of the Michigan Central, with headquarters at Detroit, has been appointed joint superintendent of telegraph at the same point; **A. Behner,** superintendent of telegraph of the New York Central, West of Buffalo, the Ohio Central Lines, the Indiana Harbor Belt and the Chicago River & Indiana, has been appointed joint assistant superintendent of telegraph, with headquarters as before at Cleveland; **S. L. Van Akin, Jr.,** superintendent of telegraph of the New York Central, Buffalo and East, with headquarters at New York, has been appointed joint assistant superintendent of telegraph, with headquarters at the same point; **A. A. Dawson,** assistant superintendent of telegraph of the Michigan Central, has been appointed joint assistant superintendent of telegraph, with headquarters as before at Detroit, and **J. L. Niesse,** superintendent of telegraph of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed joint assistant superintendent of telegraph, with headquarters as before at Indianapolis, Ind.

Following the consolidation of a number of divisions on the Chicago, Milwaukee, St. Paul & Pacific, several changes have been made in the operating personnel of this road, effective November 1. That part of the Sioux City & Dakota division, including branches, north and west of West Yard, Sioux City, Iowa, has been merged with the Iowa & Dakota division, while that part of the S. C. & D. division between Manilla, Iowa, and West Yard, Sioux City and the Des Moines division have been merged with the Iowa division. The Wisconsin Valley division has also been merged with the La Crosse & River division. **F. T. Buechler,** superintendent of the Sioux City & Dakota division, with headquarters at Sioux City, Iowa, has been appointed assistant superintendent of the Iowa division, with headquarters at the same point. **B. F. Van Vliet,** superintendent of the Des Moines division, with headquarters at Des Moines, Iowa, has also been appointed assistant superintendent of the Iowa division, with the same headquarters. **B. F. Hoehn,** superintendent of the Wisconsin Valley division, has been appointed assistant superintendent of the La Crosse & River division, with headquarters as before at Wausau, Wis. **M. T. Skewes,** assistant superintendent of the Iowa & Southern Minnesota division, with headquarters at Austin, Minn., has been transferred to the La Crosse & River division, with headquarters at La Crosse, Wis. **C. S. Christoffer,** general superintendent of the Northern district, has been appointed general superintendent, with direct supervision over the Twin City Terminal division and the Duluth division, with headquarters as before at Minneapolis, Minn., and the position of general superintendent of the Northern district has been abolished. **D. W. Kelly,** general superintendent of the Middle district, with headquarters at Milwaukee, Wis., has been appointed general superintendent, with direct supervision over the Milwaukee Terminal division and the Superior and Madison divisions, with the same headquarters, and the position of general superintendent of the Middle district has also been abolished. The position of **C. A. Bush,** assistant superintendent of the Milwaukee Terminal division, has been abolished, and Mr. Bush has been assigned to other duties. The positions of trainmaster on the Superior and Madison divisions have also been abolished.

John C. Rill, general superintendent of the Eastern Ohio Division of the Pennsylvania, with headquarters at Pittsburgh, Pa., has been promoted to general manager of the Western region, with headquarters at Chicago, succeeding **W. C. Higginbottom,** who has been transferred to the Eastern region, with headquarters at Philadelphia, Pa. Mr. Higginbottom succeeds **R. K. Rochester,** whose appointment as assistant to the vice-president in charge of operation is noted elsewhere in these columns. **J. L. Gressitt,** superintendent of the St. Louis division, with headquarters at Terre Haute, Ind., has been promoted to general superintendent of the Southwestern division, with headquarters at Indianapolis, Ind., to succeed **R. C. Miller,** who has been transferred to the Eastern Ohio division at Pittsburgh to replace Mr. Rill. **J. C. White,** superintendent of the Monongahela division with headquarters at Pittsburgh, has been transferred to the St. Louis division, to succeed Mr. Gressitt. Mr. White has been replaced on the Monongahela division by **G. S. West,** acting superintendent of motive power of the Southwestern division, with headquarters at Indianapolis.

Mr. Rill is 42 years of age and has been in the service of the Pennsylvania for more than 21 years. He was born on March 31, 1889, at Hampstead, Md. After a public school education he took a business course at Baltimore, Md., and later studied agriculture for a year, then going to Washington, D. C., to take a specialized course in business. Mr. Rill entered the service of the Pennsylvania on May 23, 1910, as a clerk at Bowie, Md., being promoted to chief clerk to the assistant trainmaster at Perryville, Md., on January 23, 1911. About three years later, Mr. Rill was advanced to assistant yardmaster at

John C. Rill

Chester, Pa., being promoted to yardmaster at that point on July 1, 1915. He was further promoted to assistant trainmaster of the Maryland division on May 14, 1917, which position he held until October 10 of that year, when he entered military service in the Engineer Corps of the United States Army. At the close of the war, Mr. Rill had be-

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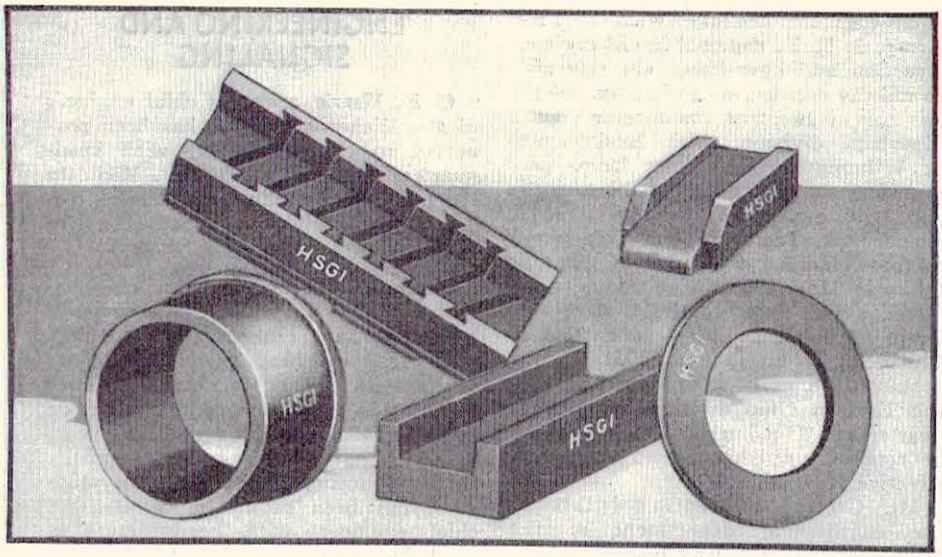

Prevent the Pounds
that Pound 'em to Pieces

THE more powerful the locomotive, the more disastrous the results of a pounding rod, crosshead, or driving box.

Specification of HUNT-SPILLER *Air Furnace* GUN IRON for those vital parts that must absorb the initial shocks and wear, offers an economical solution of this problem.

To prevent those disastrous pounds which keep your roundhouse forces busy, be sure that the Crosshead Shoes, Outer Rod Bushings, Hub Liners, Pedestal Shoes and Wedges on your locomotives are made of HUNT-SPILLER *Air Furnace* GUN IRON.

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Cylinder Bushings
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Crosshead Shoes
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HUNT-SPILLER *Air Furnace* GUN IRON

come engineer in charge with the First Army, A. E. F., engaged in railway construction and operation. On returning to railway service, he again assumed the position of assistant trainmaster on the Maryland division, with headquarters at Wilmington, Del., later being promoted to superintendent of the Logansport division, with headquarters at Logansport, Ind. He was transferred to the Columbus division, at Columbus, Ohio, in May, 1928, being again transferred a year later to the Philadelphia Terminal division, with headquarters at Philadelphia. In January, 1931, he was promoted to general superintendent of the Eastern Ohio division, with headquarters at Pittsburgh, which position he retained until his recent promotion, effective November 1.

Mr. Gressitt has advanced through the engineering department of the Pennsylvania. He was born on April 4, 1887, at Baltimore, Md., and was educated at the Baltimore Polytechnic Institute and at Lehigh University, graduating from the latter with a degree in civil engineering. He entered railway service on August 4, 1908, on the engineering corps of the Pittsburgh division of the Pennsylvania being advanced through the positions of chairman, rodman and transitman. On

J. L. Gressitt

May 1, 1915, he was promoted to assistant supervisor of track on the Bellwood division, later serving in this position at Williamsport, Pa., and at Philadelphia. From October 1, 1917, to July 10, 1919, he was in military service with the 21st Engineers. After the war he returned to the service of the Pennsylvania as acting supervisor on the Monongahela division later being promoted to supervisor, in which capacity he served during the next seven years on the Monongahela, Philadelphia Terminal and Pittsburgh divisions. He was promoted to division engineer of the Fort Wayne division on January 16, 1927, being further advanced to superintendent of the Sunbury division with headquarters at Sunbury, Pa., on December 1, 1929. About June 1, 1931, he was transferred to the St. Louis division, at Terre Haute, which position he retained until his recent promotion, effective November 1.

ENGINEERING AND SIGNALING

G. H. Harris, assistant chief engineer of the Michigan Central, has been promoted to chief engineer, with headquarters as before at Detroit, Mich., to succeed **J. F. Deimling**, who has retired. These changes became effective on November 1.

George F. Blackie, assistant chief engineer of the Nashville, Chattanooga & St. Louis, has been promoted to chief engineer, with headquarters as before at Nashville, Tenn., to succeed **Hunter McDonald**, who has retired after 52 years' service with this road, 39 years of which have been as chief engineer. **C. H. Johnson**, senior assistant engineer, has been promoted to assistant chief engineer, with headquarters at Nashville, to succeed Mr. Blackie, and the position of senior assistant engineer has been abolished.

Following the consolidation of a number of divisions on the Chicago, Milwaukee, St. Paul & Pacific and the discontinuance of the positions of district engineer, a number of changes in the personnel of the engineering department have taken place. **B. O. Johnson**, division engineer of the Sioux City & Dakota division, with headquarters at Sioux City, Iowa, has been transferred to Aberdeen, S. D., with jurisdiction over that part of the Hastings & Dakota division west of Montevideo, Minn. **H. B. Christianson**, division engineer of the Iowa division, with headquarters at Marion, Iowa, has had his jurisdiction extended to include the Des Moines division and that part of the S. C. & D. division east of McCook, S. D. **M. A. Bost**, division engineer of the Iowa & Dakota division, with headquarters at Mason City, Iowa, has had his jurisdiction extended to include that part of the S. C. & D. division west of McCook. **W. G. Powrie**, division engineer of the Iowa & Southern Minnesota division, with headquarters at Austin, Minn., has been transferred to Savanna, Ill., with jurisdiction over the Dubuque & Illinois division and the Kansas City division. **E. H. Johnson**, division engineer of the D. & I. division, has been transferred to the I. & S. M. division, at Austin, to succeed Mr. Powrie. **W. H. Vosburg**, division engineer of the Kansas City division, with headquarters at Ottumwa, Iowa, has been transferred to La Crosse, Wis., with jurisdiction over the La Crosse & River and the Wisconsin Valley divisions. **F. M. Sloane**, district engineer of the Middle district, with headquarters at Milwaukee, Wis., has been appointed division engineer of the Milwaukee Terminal, Superior and Madison divisions, with the same headquarters. **W. Lakoski**, division engineer of the Milwaukee Terminal division, has been transferred to the Milwaukee division, with headquarters as before at Milwaukee. **A. Daniels**, district engineer of the Northern district, has been appointed division engineer with jurisdiction over the Twin City Terminals and River divisions and that part of the Hastings & Dakota division east of Montevideo, with headquarters as before at Minneapolis, Minn. **C. T. Jackson**, district engineer at Chicago, has been appointed assistant engineer maintenance of way at the same point. **G. Tornes**, general supervisor of bridges and buildings, has also been appointed assistant engineer maintenance of way, with headquarters as before at Chicago.

MECHANICAL

The position of superintendent motive power of the Toronto, Hamilton & Buffalo, rendered vacant by the death of **W. T. Kuhn**, has been abolished, and **M. J. Hayes**, general foreman, locomotive department, has been appointed master mechanic.

J. A. Sheedy, superintendent of motive power of the Northwestern division of the Pennsylvania, with headquarters at Chicago, has been transferred to the Southwestern division, with headquarters at Indianapolis, Ind., succeeding **G. S. West**, acting superintendent of motive power, whose appointment as superintendent of the Monongahela division is noted elsewhere in these columns.

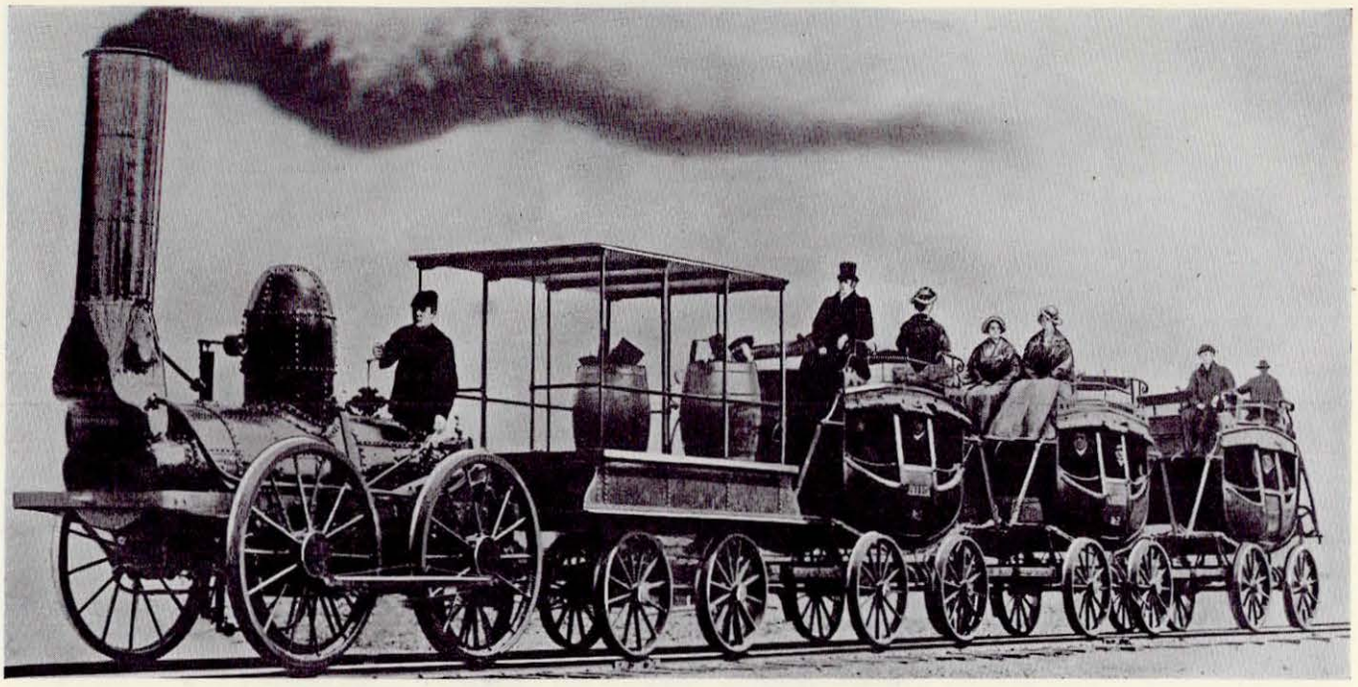
PURCHASES AND STORES

W. J. Hiner has been appointed general fuel agent of the New York Central, with headquarters at New York.

W. G. Black, mechanical assistant to the president of the Chesapeake & Ohio and the Pere Marquette, has been appointed assistant vice-president of these companies, in which position he will exercise jurisdiction over purchases and stores matters in addition to the duties he has performed heretofore. Mr. Black, whose headquarters remain at Cleveland, Ohio, succeeds **H. C. Pearce**, director of purchases and stores, who has resigned. The position of general supervisor of stores of these roads, which has been held by **J. E. Mahaney**, with headquarters at Cleveland, has been abolished. **E. A. Carlson**, division storekeeper on the Pere Marquette, with headquarters at Saginaw, Mich., has been promoted to general storekeeper, with headquarters at Grand Rapids, Mich., to succeed **W. R. Culver**, who has been transferred to the Chesapeake & Ohio, with headquarters at Huntington, W. Va., where he replaces **J. P. Kavanagh**, who has resigned. The position of assistant general storekeeper of the Pere Marquette, which has been held by **J. L. Harbry**, with headquarters at Grand Rapids, has also been abolished. These changes became effective on November 1.

OBITUARY

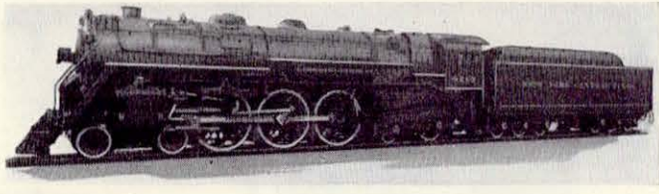
William E. McGraw, special representative of the operating vice-president of the St. Louis-San Francisco, with headquarters at St. Louis, Mo., died at that point on October 28, of apoplexy.



The Locomotive of *Yesterday* . . . .

was the marvel of its age. It is now 100 years since the DeWitt Clinton bravely puffed its way from Albany to Schenectady. This was a remarkable achievement, for it was the first passenger train in America to be pulled successfully by a steam locomotive. Its arrival was justly heralded by the music of bands and the roar of cannon—it was the symbol of railway transportation of the future.

But even the most optimistic spectator could not have dreamed of the trains of today—pulled by powerful, efficient locomotives, the development of which has made such trains possible. Capable of hauling enormous tonnage and long, heavy passenger trains, modern locomotives must, above all else have ample boiler capacity. This is assured by the use of such capacity-increasing and fuel-saving factors as Elesco superheaters and Elesco feed water heaters.



Hudson (4-6-4) Type Locomotive Equipped with Elesco Feed Water Heater and Type "E" Superheater

COMPARISON OF THE DEWITT CLINTON AND HUDSON TYPE

	DeWitt Clinton Mohawk & Hudson R. R.	Hudson type New York Central Lines
Length	23 ft. 9 in.	95 ft. 11 in.
Weight	12,096 lb.	655,000 lb.
Weight of typical train	25,020 lb.	3,111,000 lb.
Number of cars	3	16

THE SUPERHEATER COMPANY

60 East 42nd St.
NEW YORK

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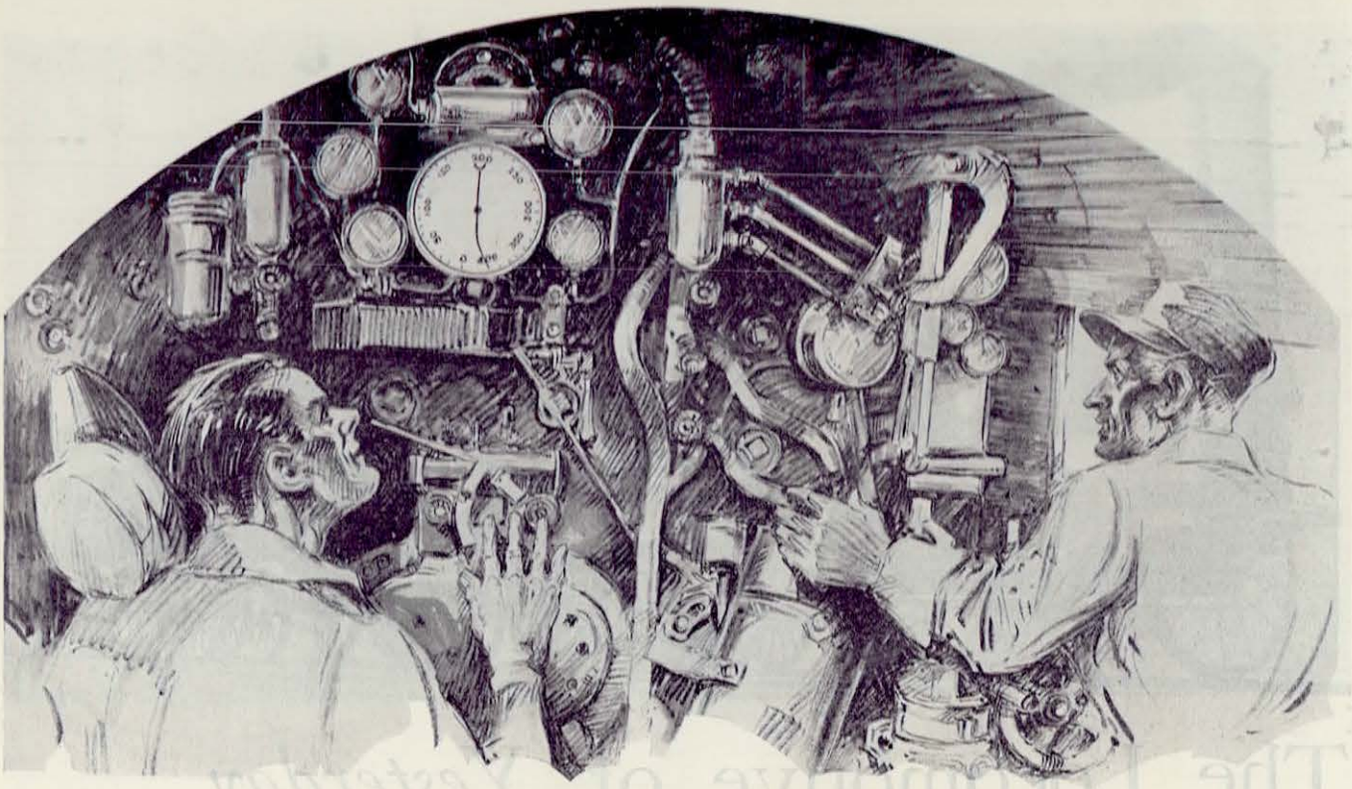
Peoples Gas Building
CHICAGO

Canada: THE SUPERHEATER COMPANY, Limited, Montreal

Superheaters
Exhaust Steam Injectors
A-646

Feed Water Heaters
Superheated Steam Pyrometers



Just as Important as the Safety Valve

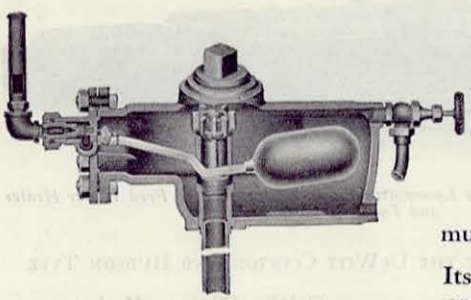
NOT merely from the standpoint of safety—to prevent boiler explosions—but, also to insure maximum efficiency from each unit the

CLEVELAND *float* Low Water Alarm

must be considered as a vital necessity not just another accessory.

Its presence on the locomotive inspires confidence—enginemen know they are taking no chances of forgetting. They do not have to allow a "factor of safety" in maintaining water levels. The CLEVELAND *Float* Low Water Alarm takes care of that safety factor automatically.

Naturally the water will be carried at a level which insures best operating results and lowest maintenance costs.



The CLEVELAND Float LOW WATER ALARM warns enginemen of false water levels—of plugged water columns in time to prevent one of the most horrible disasters that can happen on any road.

Barco Manufacturing Co.

1801 Winnemac Avenue, Chicago, Illinois

THE HOLDEN CO., LTD.

In Canada
Montreal—Moncton—Toronto

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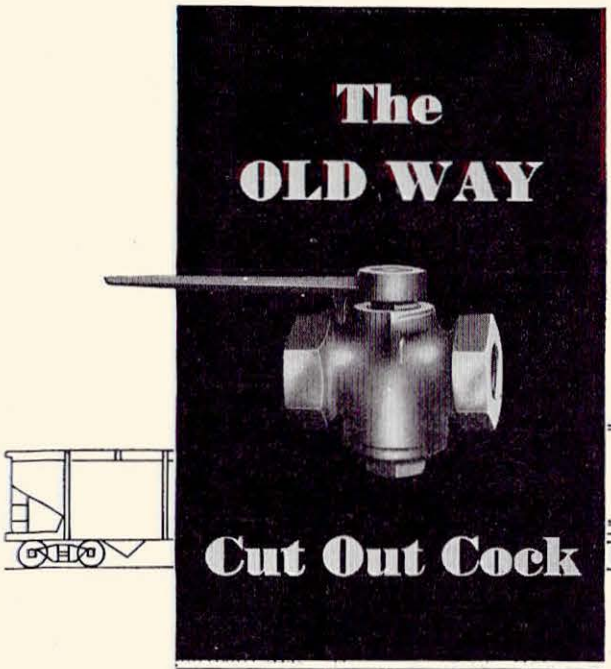
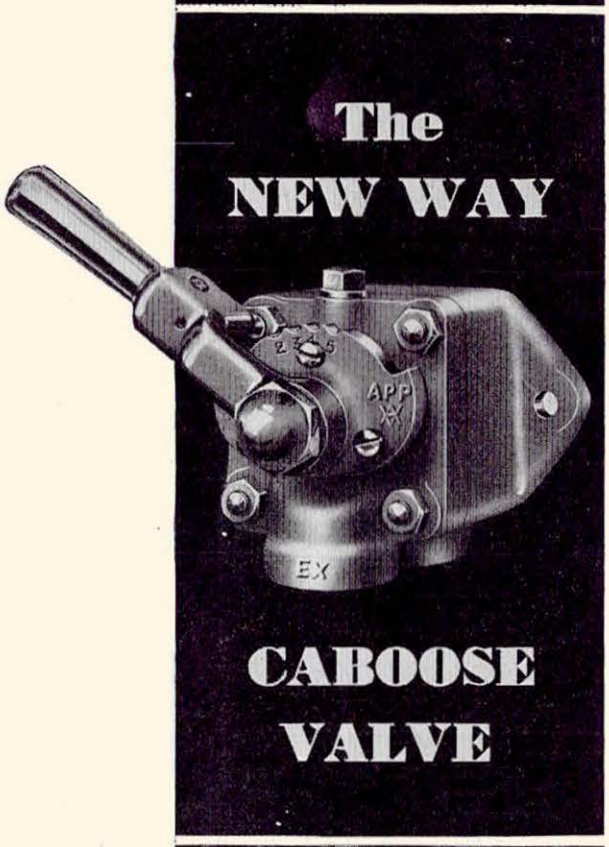
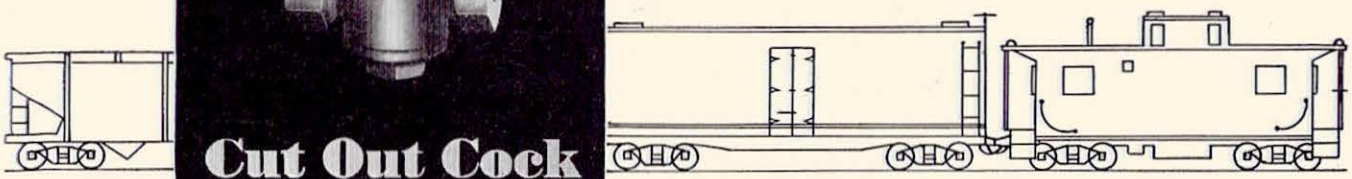
BARCO





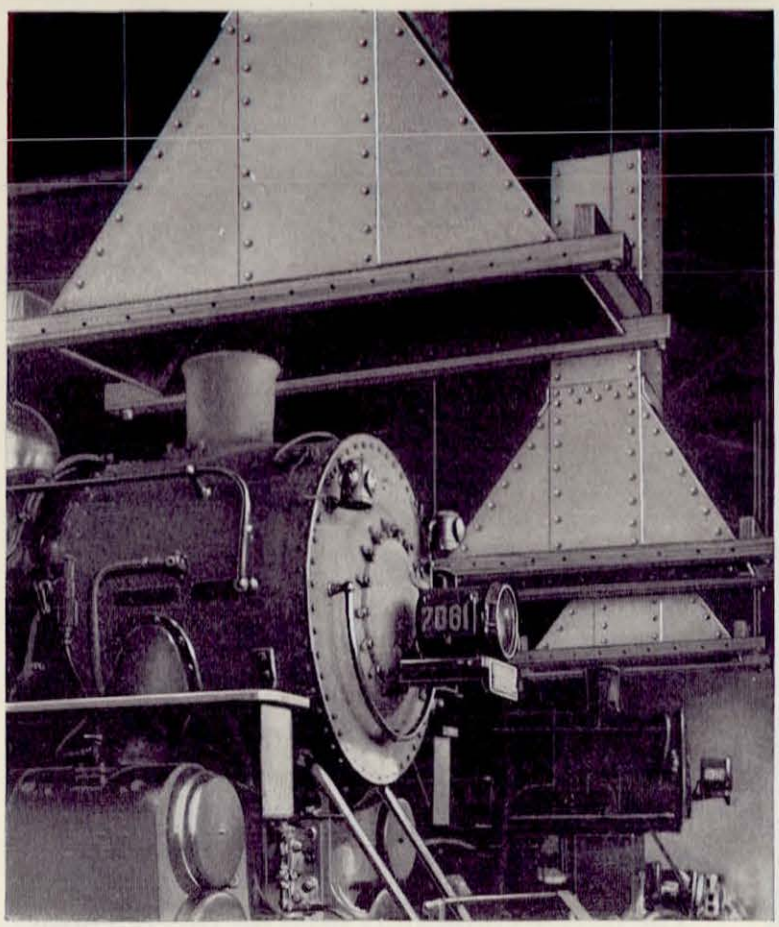


Brake applications from the rear of a freight train—which *should be avoided except in cases of real necessity*—can now be made with greater accuracy and reliability than has heretofore been possible.

The device commonly used for this purpose, an ordinary cut-out cock, lacks flexibility. Even the most cautious effort to open it gradually often results in a heavier application of the brakes than intended. Consequently a new device has been developed expressly for the purpose—The CABOOSE VALVE.

Two types are available: The A-1 which permits the desired rate of reduction, and then allows immediate return of the handle to closed position; the A-2 which permits the desired rate of reduction, but then compels movement of the handle to full application position before closure—a feature designed to prevent unwarranted use of the valve.

Where conditions *require* that applications be made from the rear of the train, the Caboose Valve will be found a valuable device. It is completely described in Circular Notice 1093. WESTINGHOUSE AIR BRAKE CO., General Office and Works—Wilmerding, Pennsylvania



For utmost resistance to weather, fire and fumes—*specify*

Carey Asbestos-Cement Smoke Jacks

CAREY Asbestos-Cement Smoke Jacks are made of sheets of Careystone Sheathing, a combination of selected asbestos fibre and Portland cement. These materials are processed under hydraulic pressure to form a rigid stone-like substance which resists weather, fire and fumes. No painting or other renewal treatment is needed at any time.

Carey Smoke Jacks are completely assembled at the factory, then knocked down and packed for shipment, all application hardware being included.

Since Carey Smoke Jacks reduce maintenance expense, they profitably replace less permanent equipment. Write our Engineering Department for full information regarding any proposed installation.

THE PHILIP CAREY COMPANY • *Lockland*, Cincinnati, Ohio

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595

TWO out of Three are G-E EQUIPPED

OF ALL the gas-electric rail cars now operating in North America, more than two-thirds are equipped with the General Electric rail-car transmission. This wide acceptance is a result of coördinated design—the generator, motors, control, and air compressor are integral parts of a transmission unit which conforms to the characteristics of the engine and meets all service and operating conditions. The following roads use G-E equipped rail cars:

Atchison, Topeka & Santa Fe
Boston & Maine
Burlington-Rock Island
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Canadian Pacific
Central Vermont
Chesapeake & Ohio
Chicago & Alton
Chicago, Burlington & Quincy
C. C. C. & St. L. (Big Four)
Chicago Great Western
Chicago, Milwaukee, St. Paul & Pacific
Chicago & Northwestern
Chicago, Rock Island & Pacific
Cincinnati Northern (Big Four)
Colorado & Southern
Erie
Grand Trunk
Great Northern
Gulf, Mobile & Northern
Huntingdon & Broad Top Mountain
Lehigh Valley
Lehigh & New England
Louisville & Nashville
Maryland & Pennsylvania
Minneapolis & St. Louis
Minneapolis, St. Paul & Sault Ste. Marie
Missouri-Kansas-Texas
Missouri Pacific
Mobile & Ohio
National Railways of Mexico
New York Central
New York, New Haven & Hartford
Northern Pacific
Pennsylvania
Reading Co.
St. Louis & San Francisco
St. Louis Southwestern
Seaboard Air Line
Southern Pacific
Toronto, Hamilton & Buffalo
Union Pacific
Wabash

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GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

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THIS IS THE BEST SEASON OF THE YEAR TO DO THE JOB!

IT PENETRATES THE SHEET
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Gives a new lease on life to old "run down" roofs. Let us send you samples and quotations.

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44th to 45th St. on Oakley Ave.
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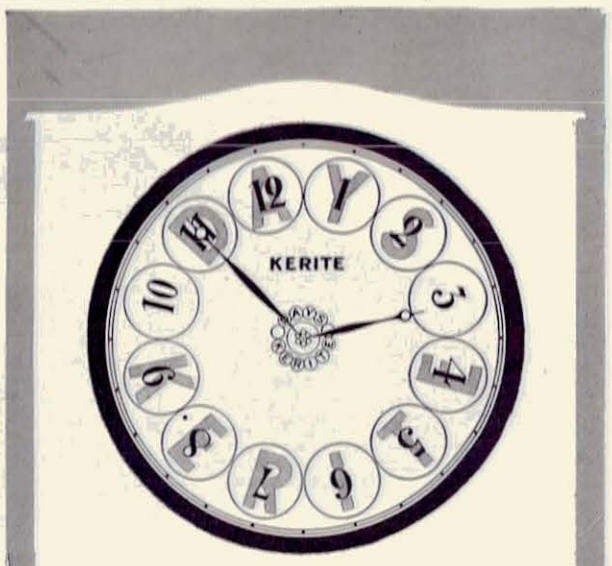

Time is the great test. The most efficient and permanent insulation known is

KERITE

THE KERITE INSULATED WIRE & CABLE COMPANY INC
NEW YORK CHICAGO SAN FRANCISCO

MAGNUS COMPANY

(INCORPORATED)

Journal Bearings

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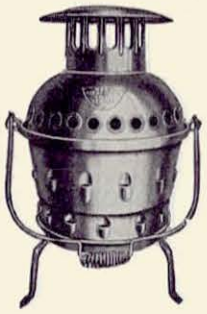

West Insector Machine

For exterminating vermin in labor camps, bunk cars, rest rooms, stations, etc.

Soon pays for itself because of its obvious economy. It has a very low operating cost, can be manipulated by unskilled labor and can be charged and shipped from place to place.

And its unquestionable effectiveness?—well, you have the usual West guarantee and the successful use of the Insector on many of the largest railroads as assurance.

WEST DISINFECTING CO.

Railroad Department

Railway Exchange Bldg. ***Chicago***

No Other Bearing Can Equal TIMKEN'S Record in Locomotive Service

TIMKEN'S record of trouble-free service in locomotives cannot even be approached by any other type of bearing.

This applies to every point of application, with particular emphasis on engine trucks—one of the most severe applications of all.

On leading American railroads, in direct competition with other anti-friction bearings in engine trucks, Timken Bearings have consistently out-performed the other bearings, under all operating conditions.

These facts are substantiated by comparative service records kept by the railroads themselves, and are therefore unprejudiced and unassailable. They can be easily verified at any time. Timken engine trucks will cut your engine truck failures to practically nothing.

After over 75,000 miles of continuous service in the Timken locomotive on 11 railroads, the wear in the Timken engine truck bearings was barely discernible.

Furthermore, no Timken Bearing at any other point in this locomotive has failed, given any trouble or been responsible for a single train detention.

This unequalled record of proved performance definitely establishes Timken supremacy in the locomotive field, and safeguards your investment when you select Timkens for your motive power.

No railroad can afford to be without Timken economies and other benefits any longer.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *Tapered Roller* **BEARINGS**

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Subsidiary of United States Steel Corporation

STEEL STRUCTURES
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GENERAL OFFICES
FRICK BUILDING
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LATERAL-MOTION DEVICE
1,300,000 cars in service on over 60 Railroads and Car Lines
ROLLER SIDE-BEARINGS
Reduces Friction on Rails 15%
Lessens Wheel Flange Wear
STANDARD CAR TRUCK CO.
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CAR HEATING
Full 2-inch Steam area
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No steam-hose Renewals
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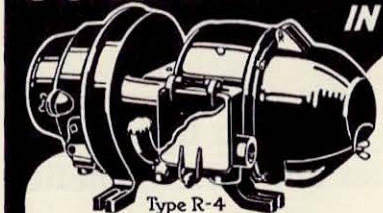
SUNBEAM EQUIPMENT FOR SAFETY IN TRAIN CONTROL

Type R-4
The Sunbeam Four-Pole Turbo-Generator has a wave-wound armature and four brushes that insure freedom from voltage ripple. A responsive governor maintains constant speed and voltage
SUNBEAM Train Control Turbo-Generators operate at constant speed, insuring close voltage regulation. Designed especially to meet the critical demands of train control, they effect great economy in steam and maintenance costs. Their performance in actual use demonstrates their reliability over long periods of service. Write for further details
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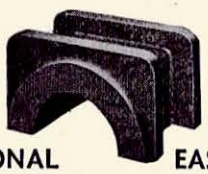

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3

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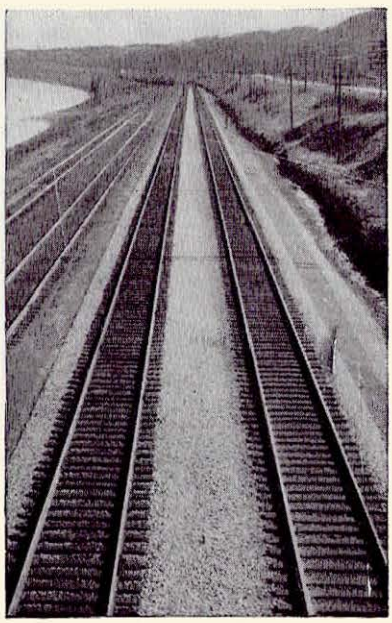

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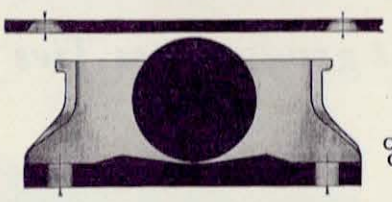
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Accounting Machines.
Remington Rand Business Service.

Acetylene, Dissolved.
Oxweld Railroad Service Co., The.

Aftercoolers, Air.
Worthington Pump & Machinery Corp.

Air Brakes.
Westinghouse Air Brake Co.

Air Lifts.
Worthington Pump & Machinery Corp.

Airport Drainage.
Republic Steel Corp.

Air Pumps.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Air Reservoir Joints — (See Joints, Air Reservoir).

Alloy Steel (See Steel, Alloy)

Alloys, Strong Aluminum.
Aluminum Co. of America.

Angle Bars — (See Joints, Rail).

Angles, Channels and Tees— (See Shapes, Structural).

Anti-Creepers, Rail.
Bethlehem Steel Co.
P. & M. Company, The.

Arch, Locomotive Brick.
American Arch Co., Inc.

Arresters, Lightning.
General Electric Co.
General Railway Signal Co.
P. & M. Company.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Ash Conveyors.
Industrial Brownhoist Corp.

Ash Handling Machinery.
Industrial Brownhoist Corp.

Ash Pans, Cast Steel.
General Steel Castings Corp.

Auxiliary Locomotive.
Bethlehem Steel Co.

Axles, Car and Locomotive.
American Locomotive Co.
Baldwin Locomotive Works.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Lima Locomotive Works.
Midvale Co., The.
Standard Steel Works Co.

Axles, Mine Car.
Mt. Vernon Car Mfg. Co.

Axles, Motor Trucks.
Timken-Detroit Axle Co.

Babbitt Metal.
National Bearing Metals Corp.
Westinghouse Elec. & Mfg. Co.

Barges, Steel.
American Bridge Co.

Barges, Treated.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
National Lumber & Creosoting Co.

Bars, Concrete Reinforcing.
Carnegie Steel Co.
Central Alloy Steel Corp.
Illinois Steel Co.
Inland Steel Co.

Bars, Iron and Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Falls Hollow Staybolt Co.
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Lockhart Iron & Steel Co.
McConway & Torley Co.
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Bearings, Ball Thrust.
S. K. F. Industries, Inc.
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Bearings, Center.
Chicago Railway Equipment Co.
Miner, W. H.
Pressed Steel Car Co.

Bearings, Journal.
Fafnir Bearing Co.
Magnus Co., Inc.
National Bearing Metals Corp.
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Timken Roller Bearing Co.

Bearings, Journal Roller.
Fafnir Bearing Co.
S. K. F. Industries, Inc.
Timken Roller Bearing Co. The.

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American Steel Foundries Co.
Fafnir Bearing Co.
Hyatt Roller Bearing Co.
Miner, W. H.
S. K. F. Industries, Inc.
Standard Car Truck Co.
Stucki Co., A.
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Q. & C. Company, The.
Stucki Co., A.

Bearings, Side.
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Stucki Co., A.
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General Steel Castings Corp.

Bell Ringer, Locomotive.
Ardco Mfg. Co.

Belt Lacing Machines.
Birdsboro Steel Foundry & Mach. Co.

Bender s, Rail.
Q & C Co., The.

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Illinois Steel Co.
Inland Steel Co.
McConway & Torley Co.
Midvale Co., The.
Republic Steel Corp.
Standard Steel Works Co.

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Barco Mfg. Co.

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American Creosoting Co.
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International Creosoting & Constr. Co.
National Lumber & Creosoting Co.
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Carnegie Steel Co.
Republic Steel Corp.

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Barco Mfg. Co.

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Oxweld Railroad Service Co., The.

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Boilers, Locomotive.
American Locomotive Co.
Baldwin Locomotive Works.
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International Nickel Co.

Bolts, Patch.
Falls Hollow Staybolt Co.

Bolts, Track.
Illinois Steel Co.
Inland Steel Co.

Bonders, Rail.
Q & C Co., The.

Bonds, Rail (See Rail Bonds)

Bonds, Signal.
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Bond, Wire Protection.
P. & M. Co., The.

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Braces, Rail.
Bettendorf Co., The.
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Aluminum Co. of America.

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Castings, Steel.
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Center Sills.
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Cleaners, Air Pump.
Dearborn Chemical Co.
Westinghouse Air Brake Co.

Cleaners, Bus & Truck.
Dearborn Chemical Co.

Cleaners, Car.
Dearborn Chemical Co.

Cleaners, General.
Dearborn Chemical Co.

Cleaners, Locomotive.
Dearborn Chemical Co.

Cleaners, Metal.
Dearborn Chemical Co.

Coaches, Motor.
General Motors Truck Co.
International Harvester Co.
White Co., The.

Coaches, Second-Hand.
Hyman-Michaels Co.

Coal, Ore & Ash Handling Machinery.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.
Roberts & Schaefer Co.

Coal Pushers.
Standard Stoker Co.

Coaling Stations.
American Bridge Co.
Fairbanks-Morse & Co.
Roberts & Schaefer Co.

Cocks, Angle.
Westinghouse Air Brake Co.

Cocks, Blow-Off.
Bird-Archer Co., The.

Columns, Water.
Prime Manufacturing Co.

Combination Crane Pile Drivers.
Industrial Brownhoist Corp.

Compounds, Boiler.
Dearborn Chemical Co.
Bird-Archer Co., The.

Compounds, Cleaning.
Dearborn Chemical Co.

Compounds, Cutting.
Dearborn Chemical Co.

Compounds, Grinding.
Dearborn Chemical Co.

Compounds, Rust Proofing.
Dearborn Chemical Co.

Compressors, Air.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Concrete Reinforcement.
American Steel & Wire Co.
Carnegie Steel Co.

Condensing Apparatus.
Worthington Pump & Machinery Corp.

Conduit, Rigid.
Aluminum Co. of America.

Conduits, Metallic Flexible.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Graybar Electric Co.
Vapor Car Heating Co. Inc.

Conduit, Underground.
Graybar Electric Co.
Johns-Manville Corp.

Connections, Lever.
National Malleable & Steel Castings Co.

Connections, Truck.
National Malleable & Steel Castings Co.

Connections, Truck Lever.
Schaefer Equipment Co.

Contraction Joint.
General Railway Signal Co.

Control Devices, Train Speed.
Union Switch & Signal Co.

Control, Locomotive.
Valve Pilot Co.

Controllers, Electric.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Conveying Machinery.
American Bridge Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Corrugated Sheet.
Aluminum Co. of America.

Conveyor, Ash—(See Coal, Ore and Ash Handling Mach.).

Coupler Pockets—(See Draft Yokes).

Coupler Yokes.
Bettendorf Co., The.

Couplers.
American Steel Foundries.
Buckeye Steel Castings Co.
Franklin Railway Supply Co., Inc.
McConway & Torley Co.
National Malleable & Steel Castings Co.
Westinghouse Air Brake Co.

Couplings, Hose.
Fort Pitt Malleable Iron Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Cranes, Ballast Cleaning.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Barge.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Bracket.
Shepbard-Niles Crane & Hoist Corp.

Cranes, Crawler.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Crawling Shovels and Draglines.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Diesel.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Electric Traveling.
Industrial Brownhoist Corp.

Cranes, Gantry.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.
Shepard-Niles Crane & Hoist Corp.

Cranes, Gasoline.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Handpower.
Industrial Brownhoist Corp.
Shepard-Niles Crane & Hoist Corp.

Cranes, Jib.
Industrial Brownhoist Corp.
Worthington Pump & Machinery Corp.

Cranes, Locomotive.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.

Cranes, Overhead.
Industrial Brownhoist Corp.
Shepard-Niles Crane & Hoist Corp.

Cranes, Pile.
Industrial Brownhoist Corp.

Cranes, Portable.
Orton Crane & Shovel Co.

Cranes, Transfer.
Industrial Brownhoist Corp.

Cranes, Traveling.
Shepard-Niles Crane & Hoist Corp.

Cranes, Wharf.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Wrecking.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Crank Pins — (See Pins, Crank).

Creosote.
American Creosoting Co.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
International Creosoting & Constr. Co.
National Lumber & Creosoting Co.

Creosote, Wood Preservative Treatment.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
National Lumber & Creosoting Co.

Cross Arms, Treated.
American Creosoting Co.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Steel.
Bethlehem Steel Co.

Crossheads & Shoes.
Baldwin Locomotive Works.
Barco Mfg. Co.
International Creosoting & Construction Co.

Crossings—(See Frogs and Crossings).

Crossings, Pavement.
Carey Co., The Philip.

Crushers, Coal.
American Sheet & Tin Plate Co.
Orton Crane & Shovel Co.

Culverts.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Culverts, Corrugated Iron.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Culverts, Part Circle.
Armco Culvert Mfrs. Assoc.

Culverts, Treated.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cups, Oil.
Hammett, H. G.
Westinghouse Air Brake Co.

Curtains, Cab.
Lehon Co., The.

Cutting and Welding Apparatus.
Oxweld Railroad Service Co.
Westinghouse Electric & Mfg. Co.

Cut-Off Indicators and Recorders.
Valve Pilot Co.

Cylinder Parts, Finished and Rough.
Locomotive Finished Material Co.
National Tube Co.

Cylinders, Air Brake.
Westinghouse Air Brake Co.

Cylinders, Cast Steel Locomotive.
General Steel Castings Corp.

Cylinders, Locomotive.
Locomotive Finished Material Co.
Union Steel Casting Co.

Deoxidizers.
Q & C Co., The.
Vanadium Corp. of America.

Derricks.
Industrial Brownhoist Corp.

Diesel Electric Power Plants.
Fairbanks-Morse & Co.
Westinghouse Elec. & Mfg. Co.

Dirt Collectors.
Westinghouse Air Brake Co.

Disinfectants.
West Disinfecting Co.

Dispatching Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Ditching Machinery.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Door Fixtures — (See Fixtures, Car Door).

Doors, Car.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
Wine Railway Appliance Co.

Doors, Locomotive Firebox.
Franklin Railway Supply Co., Inc.

Draft Arms.
American Steel Foundries.
Birdsboro Steel Foundry & Machine Co.
Universal Draft Gear Attachment Co.

Draft Gears.
American Steel Foundries.
Cardwell-Westinghouse Co.
Edgewater Steel Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Union Draft Gear Co.
Universal Draft Gear Attachment Co.

Draft Yokes.
American Steel Foundries.
Bettendorf Co., The.
Buckeye Steel Castings Co.
McConway & Torley Co.
Miner, W. H.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Steel Car Forge Co.
Universal Draft Gear Attachment Co.

Drainage Gates, Automatic.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Drains, Perforated Iron.
Republic Steel Corp.

Drawbar Centering Device.
Miner, W. H.

Drawbars, Unit Safety.
Franklin Railway Supply Co., Inc.
Industrial Brownhoist Corp.

Dredging Machinery.
Industrial Brownhoist Corp.

Drilling Machines, Rock.
General Electric Co.
Worthington Pump & Machinery Corp.

Drills, Concrete.
Worthington Pump & Machinery Corp.

Drills, Steel Rock and Steel Sharpened.
Worthington Pump & Machinery Corp.

Drills, Track & Bending.
Bird-Archer Co., The.

Drive Gas Electric Coaches.
General Electric Co.

Drive Gas Electric Locomotives
Westinghouse Electric & Mfg. Co.

Driving Boxes (Extended Main).
Franklin Railway Supply Co., Inc.

Drop Door Mechanism.
Wine Railway Appliance Co.

Dynamos — (See Generators, Electric).

Electrical Cable Accessories.
General Electric Supply Corp.

Electrical Instruments.
Electric Service Supplies Co.
Westinghouse Elec. & Mfg. Co.

Electrical Insulation.
General Cable Corp.
General Electric Supply Corp.

Electrical Porcelain Insulators.
General Electric Supply Corp.

Electrical Supplies.
General Electric Co.
General Electric Supply Corp.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Electric Cables.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Electric Heaters.
General Electric Supply Corp.

Electric Motors.
General Electric Supply Corp.

Electric Rivet Heaters.
General Electric Supply Corp.

Electric Switches.
General Electric Supply Corp.

Electrification, Railroad.
Battey & Kipp.
General Electric Co.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Enamels.
Lowe Bros. Co., The.

End Frames, Cast Steel, Passenger Car.
General Steel Castings Corp.

Ends, Steel.
Hutchins Car Rfg. Co.
Union Metal Products Co.

Engineers, Consulting, Civil, Elec., Hydraulic, Mechanical.
Battey & Kipp.
Hunt Co., Robt. W.
Muhlfeld, John E.
United Engineers & Constructors. Inc.

Engineers and Contractors.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Construction.
Battey & Kipp.
Roberts & Schaefer Co.
United Engineers & Constructors, Inc.

Engineers, Inspecting.
Gulick-Henderson Co.
Hunt Co., Robert W.
Muhlfeld, John E.
Pittsburgh Testing Laboratory.
United Engineers & Constructors, Inc.

Engineers, Valuation.
Hunt Co., Robert W.
United Engineers & Constructors, Inc.

Engines, Crude & Fuel Oil.
Fairbanks-Morse & Co.
Worthington Pump & Machinery Corp.

Engines, Diesel.
Worthington Pump & Machinery Corp.

Engines, Gas.
Worthington Pump & Machinery Corp.

Engines, Gas & Gasoline.
Fairbanks-Morse & Co.
Worthington Pump & Machinery Corp.

Engines, Hoisting.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Excavators.
Industrial Brownhoist Corp.

Exhaust & Ventilating Fans.
General Electric Supply Corp.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Fasteners, Car Door.
Camel Sales Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Feed Water Heater Systems.
Bird-Archer Co., The.
Superheater Co.
Worthington Pump & Machinery Corp.

Fencing Wire—(See Wire, Fence).

Fence Posts, Treated.
American Steel & Wire Co.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Ferro Alloys.
Vanadium Corp. of America.

Ferro, Chromium.
Vanadium Corp. of America.

Ferro, Molybdenum.
Vanadium Corp. of America.

Ferro, Silicon.
Vanadium Corp. of America.

Ferro, Tungsten.
Vanadium Corp. of America.

Ferro, Vanadium.
Vanadium Corp. of America.

Filters, Air.
Westinghouse Air Brake Co.

Filters, Water & Industrial.
Graver Tank & Mfg. Corp.

Filtration Plants (Water).
Graver Tank & Mfg. Corp.

Fireboxes.
American Locomotive Co.
Baldwin Locomotive Works.

Fire Fighting & Protection Equipment.
Johns-Manville Corp.

Fittings, Air Brake.
Westinghouse Air Brake Co.

Fittings, Steam.
Vapor Car Heating Co., Inc.

Fixtures, Car Door.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H
National Malleable & Steel Castings Co.

Flangers, Snow.
Q & C Co., The.

Floodlights.
General Electric Supply Corp.
Graybar Electric Co.
Oxweld Railroad Service Co.
Pyle-National Co.
Westinghouse Elec. & Mfg. Co.

Floodlights, Acetylene.
Oxweld Railroad Service Co., The.

Flooring.
Carey & Co., Philip, The.
Johns-Manville Corp.

Flooring, Car.
Tuco Products Corp.

Flooring, Coach.
Tuco Products Corp.

Flooring, Composition.
Johns-Manville Corp.
Tuco Products Corp.

Flooring, Treated.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Floor Plates, Steel.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Company.

Floor Slabs, Concrete.
American Cement Tile Mfg. Co.

Flue Cleaners—(See Cleaners, Flue).

Flue Cutters—(See Cutters, Flue).

Flues, Boiler—(See Tubes, Boiler).

Forging Hammers.
Industrial Brownhoist Corp.

Forgings.
American Bridge Co.
American Steel Foundries.
Baldwin Locomotive Works.
Bethlehem Steel Co.
Carnegie Steel Co.
Edgewater Steel Co.
General Railway Signal Co.
Illinois Steel Co.
Midvale Co., The.
Mt. Vernon Car Mfg. Co.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Steel Car Forge Co.
Universal Draft Gear Attachment Co.

Forgings, Drop.
Baldwin Locomotive Works.
General Railway Signal Co.
Steel Car Forge Co.
Union Switch & Signal Co.

Forgings, Monel Metal.
International Nickel Co.

Foundry Supplies.
Bird-Archer Co., The.

Frames, Cast Steel Locomotive.
General Steel Castings Corp.

Frames, Locomotive.
American Steel Foundries.
American Locomotive Co.
Baldwin Locomotive Works.
Birdsboro Steel Foundry & Machine Co.
Ohio Steel Foundry Co.
Union Steel Casting Co.

Frames, Truck.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works.
Bettendorf Co., The.
Birdsboro Steel Foundry & Machine Co.
Buckeye Steel Castings Co.
Franklin Railway Supply Co., Inc.
Ohio Steel Foundry Co.
Pressed Steel Car Co.
Pyle-National Co.

Frames, Vanadium.
American Locomotive Co.
Baldwin Locomotive Works.
Birdsboro Steel Foundry & Machine Co.
Union Steel Casting Co.

Frogs and Crossings.
Bethlehem Steel Co.
Ramapo-Ajax Corp.

Fulcrums, Brake Beam.
American Steel Foundries.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
National Malleable & Steel Castings Co.

Furnaces, Electric.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Furnaces, Rivet Heating—(See Forges, Rivet Heating).

Furniture.
Aluminum Co. of America.

Gage Testers—(See Testers, Gage).

Gages, Air.
Westinghouse Air Brake Co.

Gages, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Gages, Steam.
Ashton Valve Co.

Gages, Tire.
Schrader's Son, Inc., A.

Gages, Wheel Press Recording.
Ashton Valve Co.

Gaskets.
Westinghouse Air Brake Co.

Gasoline.
Ethyl Gasoline Corp.

Gear Blanks, Rolled Steel.
Edgewater Steel Co.
Standard Steel Works Co.

Gears and Pinions.
American Steel Foundries.
Westinghouse Elec. & Mfg. Co.

Gears, Silent.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Generators, Acetylene.
Oxweld Railroad Service Co.

Generators, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Sunbeam Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Goggles, Welding.
Oxweld Railroad Service Co., The.
Sunbeam Electric Mfg. Co.

Graders, Elevating.
Western Wheeled Scraper Co.

Grapples, Wood.
Industrial Brownhoist Corp.

Grate Bars.
Q & C Co., The.

Grate Shakers, Automatic.
Franklin Railway Supply Co., Inc.

Grates.
Firebar Corp.

Grease Forming Machines.
Franklin Railway Supply Co., Inc.

Grey Iron.
American Brake Shoe & Foundry Co.

Grinders, Internal.
Micro Machine Co.

Grinders, Portable Crank Pin.
Micro Machine Co.

Guard Rails, Treated.
Curtin-Howe Corp.
International Creosoting & Construction Co.

Guard Rails, Foot Guard.
Q & C Co., The.

Guard Rails (One Piece).
Bethlehem Steel Co.
Ramapo-Ajax Corp.

Guard Switch Point.
Q & C Co., The.

Guards, Cattle.
American Bridge Co.

Hair Felt.
Johns-Manville Corp.

Hammers, Steam.
Industrial Brownhoist Corp.

Hand Brakes—(See Brakes, Hand).

Hangers, Ball Bearing.
S. K. F. Industries, Inc.

Hand Rails & Fittings.
Aluminum Co. of America.

Hangers, Bottom Rod Safety.
Chicago Railway Equipment Co.

Hangers, Car Door — (See Fixtures, Car Door).

Headgates, Sliding.
Armco Culvert Mfrs. Assn.

Headlight Repair Parts, Electric.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlights, Electric.
General Electric Co.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.
Westinghouse Electric & Mfg. Co.

Headlights, Reflectors and Cases.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Heaters, Electric.
Westinghouse Electric & Mfg. Co.

Heaters, Feedwater.
Graver Tank & Mfg. Corp.

Heaters, Feedwater Locomotive.
Superheater Company, The.
Worthington Pump & Machinery Corp.

Heaters, Feed Water, Stationary.
Worthington Pump & Machinery Corp.

Heating & Ventilating Apparatus.
Vapor Car Heating Co., Inc.
Westinghouse Electric & Mfg. Co.

Heating Equipment, Car.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Heating Systems, Car (Electric and Steam).
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

High Temperature Cements.
Carey & Co., Philip, The.

Highway Crossing Protection Devices.
American Bridge Co.
Franklin Railway Supply Co., Inc.
Griswold Signal Co.
Railroad Supply Co.

Hoisting Machinery.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Hooks, Wrecking.
National Malleable & Steel Castings Co.

Horns, Pneuphonic.
Westinghouse Air Brake Co.

Hose, Air, Steam, Etc.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Hose, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Hose, Tender.
Westinghouse Air Brake Co.

Incandescent Lamps.
General Electric Supply Corp.

Indicators, Speed & Cut-off
Valve Pilot Co.

Ingots.
Birdsboro Steel Foundry & Machine Co.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
McConway & Torley Co.
Standard Steel Works Co.

Injectors, Exhaust Steam.
Superheater Co., The.

Inspection of Material and Equipment—(See Engineers, Inspection).

Insulated Wire.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Insulation, Car.
Carey Co., Philip, The.
Wood Conversion Co.

Insulation, Car, Bldg.
Carey Co., Philip, The.
Johns-Manville Corp.
Lehon Co., The.
Tuco Products Corp.
Union Asbestos & Rubber Co.
Wood Conversion Co.

Insulation, Electrical.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulation, Exhaust & Heater Pipe.
Carey Co., Philip, The.
Johns-Manville Corp.
Tuco Products Corp.
Union Asbestos & Rubber Co.

Insulation, Heat.
Carey Co., Philip, The.
Miner, W. H.

Insulation Tape.
General Electric Supply Corp.

Insulators, Electrical, Porcelain.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Interlocking Plant Equipment.
General Railway Signal Co.
Union Switch & Signal Co.

Iron Chain.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.

Iron, Charcoal.
Bethlehem Steel Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.

Iron, Engine Bolt.
Lockhart Iron & Steel Co.

Iron, Forging Billets.
Lockhart Iron & Steel Co.

Iron, Hollow Staybolt.
Falls Hollow Staybolt Co.

Iron, Hollow Staybolt Bars.
Bethlehem Steel Co.
Falls Hollow Staybolt Co.

Iron, Pig.
Bethlehem Steel Co.

Iron, Refined.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.

Iron, Staybolt — (See also Staybolts).
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.

Jacking, Locomotive.
Carey Co., Philip, The.

Jacking Method of Installing Pipe.
Armco Culvert Mfrs. Assn.

Jacks, Smoke.
Carey Co., Philip, The.
Johns-Manville Corp.

Joints, Air Reservoir.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Blow Off Line (Roundhouse).
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Coach and Coach Yard.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Flexible.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co. Inc.

Joints, Flexible Ball.
Barco Mfg. Co.

Joints, Rail.
American Steel Foundries.
Carnegie Steel Co.
Illinois Steel Co.
Q & C Co., The.
Rail Joint Co.
Union Switch & Signal Co.

Joints, Steam, Air & Liquid.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Swing.
Barco Mfg. Co.
Vapor Car Heating Co., Inc.

Journal Boxes and Lids.
Allegheny Steel Co.
American Steel Foundries.
Hunt-Spiller Mfg. Corp.
National Malleable & Steel Castings Co.
Pullman Car & Mfg. Corp.
Railway Steel Spring Co.
Union Spring & Mfg. Co.

Journal Oilers, Car & Locomotive.
Ardco Mfg. Co.

Keys, Brake Shoe.
Buffalo Brake Beam Co.
Mt. Vernon Car Mfg. Co.
Steel Car Forge Co.
Union Spring & Mfg. Co.

Knuckles, Emergency.
Q & C Co., The.

Laboratories, Testing.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Lacquers.
General Electric Supply Corp.

Ladders, Steel Car.
Wine Railway Appliance Co.

Lagging, Locomotive.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lamps, Incandescent.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Inspector's.
Oxweld Railroad Service Co., The.

Lath, Metal.
Armco Railroad Sales Co.

Lead, White.
National Lead Co.

Lighting Equipment, Car.
Electric Storage Battery Co.

Lighting Fixtures and Systems.
General Electric Supply Corp.
Graybar Electric Co.
Pyle-National Co.

Lighting Plants, Gas, Electric
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.

Lightning Arresters.
General Electric Supply Corp.

Line Material.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lock Nuts—(See Nut Locks).

Locomotive Jacket Sheets.
Armco Railroad Sales Co.

Locomotive Water Conditioners.
Bird-Archer Co., The.

Locomotives, Contractors.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Electric.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Gasoline.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Geared.
Lima Locomotive Works.

Locomotives, Industrial.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Mine.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Oil Engine, Electric Driven.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Whitcomb Co., Geo. D., The.

Locomotives, Rebuilt.
American Locomotive Co.

Locomotives, Repair Parts.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Steam.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotive Valve Pilot.
Valve Pilot Co.

Lubricators, Driving Box.
Franklin Railway Supply Co., Inc.

Lubricators, Piston Rod.
Q & C Co., The.

Lumber, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lumber, Treated.
American Creosoting Co.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
Curtin-Howe Corp.
Industrial Lumber & Creosoting Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Machinery, Hydraulic.
Birdsboro Steel Foundry & Mach. Co.

Machine Screws, Monel Metal
International Nickel Co.

Magnets, Lifting.
Industrial Brownhoist Corp.

Mechanical Draft Apparatus—(See Heating and Vent. App.).

Mechanical Stokers.
Standard Stoker Co.

Meters, Snow, Electric.
Q & C Co., The.

Metallic Flexible Conduit.
General Electric Supply Corp.

Meters, Water & Oil.
Worthington Pump & Machinery Corp.

Milling Machines, Portable Frame Jaw.
Micro Machine Co.

Mohair Upholstery Velvets.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Molybdenum Metal.
Vanadium Corp. of America.

Monel Metal, Rods, Sheets, Tubes, Wire, etc.
International Nickel Co.

Motors, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Motors & Generators.
Fairbanks-Morse & Co.

Moulding.
Aluminum Co. of America.

Multiple V Belt Drives.
Worthington Pump & Machinery Corp.

Nails.
American Steel & Wire Co.
Reading Iron Co.

Nozzles, Exhaust.
Franklin Railway Supply Co., Inc.

Nozzles, Oxy-Acetylene Cutting.
Oxweld Railroad Service Co., The.

Nuts—(See Bolts and Nuts).

Nut Locks.
Dardelet Threadlock Corp.
Grip Nut Co.

Office Appliances.
Remington-Rand Business Service.

Oils, Diesel Engine.
Vacuum Oil Co.

Oil, Dynamo.
Vacuum Oil Co.

Oil-Electric Locomotives.
American Locomotive Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Oil Filtering & Storage Systems.
Graver Tank & Mfg. Corp.

Oils & Greases, Engine.
Vacuum Oil Co.

Oils & Greases, Lubricating.
Vacuum Oil Co.

Oils & Greases, Motor.
Vacuum Oil Co.

Oil, Linseed.
National Lead Co.

Oils, Locomotive Valve.
Vacuum Oil Co.

Oil Plugs, Steam Chest.
Franklin Railway Supply Co., Inc.

Oil, Turbine.
Vacuum Oil Co.

Oxy-Acetylene Apparatus.
Oxweld Railroad Service Co., The.

Oxygen.
Oxweld Railroad Service Co., The.

Packing.
Westinghouse Air Brake Co.

Packing, Air Pump.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.

Packing, Cylinder and Valve Ring.
Johns-Manville Corp.
Hunt-Spiller Mfg. Corp.
Locomotive Finished Material Co.
Westinghouse Air Brake Co.

Packing, Locomotive Cab Cock.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing, Ring Boiler.
Union Asbestos & Rubber Co.

Packing, Semi-Metallic.
Pilot Packing Co.
Central Alloy Steel Corp.

Packing, Sheet.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing, Soft.
Carey & Co., Philip, The.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.

Packing, Throttle.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Paint Burners, Acetylene.
Oxweld Railroad Service Co., The.

Paint, Metal Protective.
Lowe Bros. Co., The.
National Lead Co.

Paint, Powder.
Aluminum Co. of America.

Paint Spraying Equipment.
De Vilbiss Mfg. Co., The.

Paints.
Lowe Bros. Co., The.
National Lead Co.

Paper, Carbon.
Remington-Rand Business Service.

Paper, Sheathing.
Carey & Co., Philip, The.

Patterns for Iron, Steel and Brass Castings.
Baldwin Locomotive Works,

Pavement Breakers.
Worthington Pump & Machinery Corp.

Pickling Equipment, Monel Metal.
International Nickel Co.

Pile Drivers.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Piling, Treated.
American Creosoting Co.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Piling, Sheet Steel.
American Bridge Co.
Carnegie Steel Co.
Inland Steel Company.

Piling, Wood.
National Lumber & Creosoting Co.

Pilot Beams, Cast Steel.
General Steel Castings Corp.

Pilots, Cast Steel.
General Steel Castings Corp.
Locomotive Finished Material Co.

Pins, Center.
Miner, W. H.

Pins, Coupler Knuckle.
McConway & Torley Co.
National Malleable & Steel Castings Co.

Pins, Crank.
American Locomotive Co.
Baldwin Locomotive Works.
Miner, Inc., W. H.
Standard Steel Works Co.
Union Asbestos & Rubber Corp.

Pipe, Corrugated Iron.
Armco Culvert Mfrs. Assn.

Pipe, Paved Invert.
Armco Culvert Mfrs. Assn.

Pipe Coverings.
Carey & Co., Philip, The.
Johns-Manville Corp.
Keasby & Mattison Co.

Pipe Fittings—(See Fittings, Pipe).

Pipe, Metal Culvert.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Republic Steel Corp.

Pipe, Perforated Iron.
Armco Culvert Mfrs. Assn.

Pipe, Spiral Welded.
Armco Railroad Sales Co.

Pipe, Steel Signal.
National Tube Co.

Pipe, Wrought Iron.
Byers Co., A. M.
Reading Iron Co.

Plates.
Steel Car Forge Co.

Plates, Follower.
Steel Car Forge Co.

Plates, Boiler, Firebox—(See Steel, Firebox).

Plates, Center — (See Bearings, Center).

Plates, Iron & Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.

Plate & Sheet Metal Work.
Baldwin Locomotive Works.

Plates, Tie.
Illinois Steel Co.
Inland Steel Company.
Tennessee Coal, Iron & Railroad Co.

Plates, Tin and Terne.
American Sheet & Tin Plate Co.

Platforms, Cast Steel, Passenger Car.
General Steel Castings Corp.

Plows, Railroad and Grading.
Western Wheeled Scraper Co.

Plows, Snow.
American Locomotive Co.
Q & C Co., The.

Plush, Mohair.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Poles, Creosoted.
National Lumber & Creosoting Co.

Poles, Power Distribution.
National Lumber & Creosoting Co.

Poles, Preservatively Treated.
National Lumber & Creosoting Co.

Poles, Signal.
American Creosoting Co.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
Curtin-Howe Corp.
General Railway Signal Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co
Union Switch & Signal Co

Poles, Steel Tubular.
Graybar Electric Co.
National Tube Co.

Poles, Telegraph.
National Lumber & Creosoting Co.

Poles, Transmission.
National Lumber & Creosoting Co.

Poles, Treated.
American Creosoting Co.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
General Electric Supply Corp.
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Poles, Wood.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Posts, Farm.
National Lumber & Creosoting Co.

Posts, Fence, Treated.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
Curtin-Howe Corp.
Inland Steel Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Posts, Highway.
National Lumber & Creosoting Co.

Posts, Steel Fence.
American Steel & Wire Co.
Q & C Co., The.

Posts, Wood.
National Lumber & Creosoting Co.

Powdered Coal Equipment.
Muhlfeld, John E.

Power Plants.
General Electric Co.
Muhlfeld, John E.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Preservatives, Wood.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Presses, Flanging Hydraulic
Birdsboro Steel Foundry & Machine Co.

Presses, Hydraulic.
Baldwin-Southwark Corp.
Birdsboro Steel Foundry & Machine Co.

Presses, Wheel.
Birdsboro Steel Foundry & Machine Co.

Pulverizers, Coal — (See Crushers, Coal).

Pumping Stations.
Fairbanks-Morse & Co.

Pump Liners, Monel Metal.
International Nickel Co.

Pump Rods, Monel Metal.
International Nickel Co.

Pump Shafts, Monel Metal.
International Nickel Co.

Pumps, Hydraulic.
Worthington Pump & Machinery Corp.

Pumps & Pumping Mchy.
Fairbanks-Morse & Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Poles, Creosoted.
National Lumber & Creosoting Co.

Pumps, Vacuum.
Worthington Pump & Machinery Corp.

Pushers, Coal.
Standard Stoker Co.

Pyrometers, Superheated Steam.
Superheater Co., The.

Rail Anchors.
Bethlehem Steel Co.
P. & M. Co., The.

Rail-Bonds.
American Steel & Wire Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Union Switch & Signal Co
Westinghouse Elec. & Mfg. Co.

Rail Braces — (See Braces, Rail).

Railroad Shops.
United Engineers & Constructors, Inc.

Railroad Structures — (See Engineers and Contractors; also Building).

Rail Splice Plates — (See Joints, Rail).

Rails.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Tennessee Coal, Iron & Railroad Co.
Thomson Rail Corp.

Railway Signals.
General Electric Supply Corp.

Receivers, Air.
Westinghouse Air Brake Co.

Recorders, Speed & Cut-off.
Valve Pilot Co.

Rectifiers for Signal Work.
General Electric Co.
Union Switch & Signal Co.

Reducing Valves.
Vapor Car Heating Co., Inc.

Reflectors, Headlight.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.

Refrigerators.
Wine Railway Appliance Co.

Regulators, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Relays.
General Railway Signal Co.
Union Switch & Signal Co
Westinghouse Elec. & Mfg. Co.

Repair Parts, Stoker.
Standard Stoker Co.
Q & C Company, The.

Retorts, Creosoting.
Graver Tank & Mfg. Corp

Reverse Gear, Power.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Ringers, Bell.
Hammett, H. G.

Riveters, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Rivets.
Inland Steel Co.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Russell, Burdsall & Ward Bolt and Nut Co.

Rods.
Neely Nut & Bolt Co.

Rolled Steel.
Carnegie Steel Co.

Roller Bearings—(See Bearings, Roller).

Rolls, Bending & Straightening.
Birdsboro Steel Foundry & Machine Co.

Roofing, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.
Lehon Co., The.

Roofing, Buildings.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Lehon Co., The.
Johns-Manville Corp.
Superior Sheet Steel Co.

Roofing, Car.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey & Co., Philip, The.
Hutchins Car Rfg. Co.
Johns-Manville Corp.
Lehon Co., The.
Superior Sheet Steel Co.,
Tuco Products Corp.
Union Metal Products Co.

Roofing, Corrugated.
Armco Railroad Sales Co
American Sheet & Tin Plate Co.
Carey Co., Philip, The.
Johns-Manville Corp.

Roofing, Tin.
American Sheet & Tin Plate Co.

Rope, Wire — (See Wire Rope).

Rust Preventatives.
Dearborn Chemical Co.

Safe Ends.
National Tube Co.

Sand Drying Plants.
Roberts & Schaefer Co.

Sanitary Products.
West Disinfecting Co.

Sash Balances.
Tuco Products Co.

Saws, Portable Rail.
Industrial Brownhoist Corp.
Q & C Co., The.

Scales.
Fairbanks-Morse & Co.

Scrapers, Wheeled and Drag
Western Wheeled Scraper Co.

Screens, Passenger Car.
Tuco Products Corp.

Shafting.
Falls Hollow Staybolt Co.
Standard Steel Works Co.

Shapes, Pressed Steel.
Pressed Steel Car Co.

Shapes, Structural.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.

Sheds, Train.
American Bridge Co.
Inland Steel Co.

Sheets, Black and Galvanized.
Allegheny Steel Co.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.

Sheets, Blue Annealed.
Allegheny Steel Co.

Sheets, Building, Special Car, Corrugated & Plain.
Armco Railroad Sales Co.

Sheets, Corrugated.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Carnegie Steel Co.
Johns-Manville Corp.

Sheets, Corrugated & Plain.
Inland Steel Co.

Sheets, Electrical.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Republic Steel Corp.

Sheets, Iron & Steel.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Superior Sheet Steel Co.

Sheets, Locomotive Jacket.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co
Inland Steel Co.

Sheets, Polished or Planished Iron.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.

Sheets, Steel.
Armco Railroad Sales Co.
Inland Steel Co.

Sherardising Plants.
General Electric Co.

Shovels & Draglines.
Industrial Brownhoist Corp

Shovels, Steam, Gasoline & Electric.
Orton Crane & Shovel Co.

Siding, Iron & Steel.
Armco Railroad Sales Co

Siding, Bldg., Car, Corrugated & Plain.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Inland Steel Co.

Siding, Corrugated & Plain
Carey & Co., Philip, The
Johns-Manville Corp.

Signal Accessories.
Electric Storage Battery Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Signals, Automatic Cab.
General Railway Signal Co.
Union Switch & Signal Co

Signal Blades.
General Railway Signal Co.
Union Switch & Signal Co.

Signals, Crossing.
Union Switch & Signal Co.

Signals, Crossing Protection.
General Railway Signal Co.

Signals, Railway.
General Electric Co.
Union Switch & Signal Co.

Sign Posts, Treated.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
National Lumber & Creosoting Co.

Silico Manganese.
Vanadium Corp. of America.

Slag, Blast Furnace.
Carnegie Steel Co.

Slotting Machines, Locomotive Cylinder.
American Steel & Wire Co.

Sludge Removers.
Bird-Archer Co., The.

Soap, Liquid.
West Disinfecting Co.

Solder.
National Bearing Metals Corp.
Westinghouse Elec. & Mfg. Co.

Spark Arresters.
Locomotive Firebox Co.

Speed Indicators & Recorders.
Valve Pilot Corp.

Spikes.
American Steel & Wire Co.
Bethlehem Steel Co.
Illinois Steel Co.
Inland Steel Co.

Splice Bars, Angle.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.

Spring Plates or Seats.
Allegheny Steel Co.
National Malleable & Steel Castings Co.
Union Spring & Mfg. Co.

Springs.
American Steel Foundries Co.
American Steel & Wire Co.
Baldwin Locomotive Works.
Pittsburgh Spring & Steel Co.
Railway Steel Spring Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Switch & Signal Co.

Springs, Vanadium Steel.
Pittsburgh Spring & Steel Co.
Union Spring & Mfg. Co.

Stacks, Steel.
American Bridge Co.
Graver Tank & Mfg. Corp.

Stands, Switch & Target.
Q & C Co., The.

Staybolts.
American Locomotive Co.

Staybolts, Hollow.
Falls Hollow Staybolt Co.

Steam Chests.
Franklin Railway Supply Co., Inc.

Steam Enclosures, Corrugated Iron.
Republic Steel Corp.

Steam Shovels.
Orton Crane & Shovel Co.

Steel Alloy.
Bethlehem Steel Co.
Illinois Steel Co.
Republic Steel Corp.
Standard Steel Works Co.

Steel, Firebox.
Carnegie Steel Co.
Illinois Steel Co.

Steel & Iron, Stainless.
Allegheny Steel Co.

Steel, Open Hearth.
Carnegie Steel Co.
Illinois Steel Co.

Steel Plate Construction.
Graver Tank & Mfg. Corp.

Steel, Structural.
American Bridge Co.
Carnegie Steel Co.
Graver Tank & Mfg. Corp
Illinois Steel Co.
Inland Steel Co.

Steel, Tool.
Illinois Steel Co.
Midvale Co., The.
Q & C Co., The.

Step Joints.
Q & C Co., The.
Rail Joint Co.

Steps, Car—(See Car Steps Safety).

Stokers, Locomotive.
Lower Stoker Co.
Standard Stoker Co.

Stokers, Mechanical.
Westinghouse Elec. & Mfg Co.

Stoker Repair Parts.
Lower Stoker Co.
Standard Stoker Co.

Storm Sewers, Corrugated Iron.
Republic Steel Corp.

Strainer, Air.
Westinghouse Air Brake Co.

Stringers, Bridge, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Structural Shapes, Rolled Shapes.
Carnegie Steel Co.

Superheaters.
Superheater Co., The.

Supports, Bottom Rod Safety.
Chicago Railway Equipment Co.

Switch Boards.
Graybar Electric Co.
Johns-Manville Corp.
Westinghouse Elec. & Mfg. Co.

Switch Machines.
General Railway Signal Co

Switch Movements.
Union Switch & Signal Co

Switch Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Switches, Electric.
Electric Service Supplies Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg Co.

Switches & Switch Stands.
Ramapo-Ajax Corp.

Syphons, Corrugated Iron.
Republic Steel Corp.

Syphons, Locomotive, Boilers
Locomotive Firebox Co.

Tables, Welding.
Oxweld Railroad Service Co., The.

Tank Cars.
General Am. Tank Car Corp.

Tanks, Acetylene, Gas.
Oxweld Railroad Service Co., The.

Tanks.
American Bridge Co.
American Locomotive Co.
Baldwin Locomotive Works.
Graver Tank & Mfg. Corp
National Tube Co.
Pressed Steel Car Co.
Westinghouse Air Brake Co.

Tape, Insulation.
Johns-Manville Corp.
Westinghouse Elec. & Mfg Co.

Tele. & Tele. Wire.
American Steel & Wire Co
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Terminals, Railroad.
United Engineers & Constructors, Inc.

Testers, Gage.
Ashton Valve Co.

Testing Machines.
Baldwin-Southwark Corp.

Thermostats.
Vapor Car Heating Co. Inc.

Tie Plates. (See Plates, Tie)

Ties, Creosoted.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Ties, Steel.
American Bridge Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Timbers, Pre-framed, Treated
National Lumber & Creosoting Co.

Timber, Treated.
American Creosoting Co.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Wood Conversion Co.

Tires.
Firestone Tire & Rubber Co.
General Tire & Rubber Co
Goodyear Tire & Rubber Co.
Goodrich Rubber Co., B. F

Tires, Steel.
Edgewater Steel Co.
Midvale Co., The.
Railway Steel Spring Co.
Standard Steel Works Co.

Toilet Papers.
U. S. Envelope Co.

Tools, High Speed Steel.
Bethlehem Steel Co.
Bird-Archer Co., The.

Towers, Floodlight.
Pyle-National Co.

Track Skates.
Q & C Co., The.

Tractors.
Caterpillar Tractor Co.
Elwell-Parker Electric Co

Tractors, Industrial.
Elwell-Parker Electric Co
International Harvester Co

Tractors, Turntable.
Nichols & Bro., Geo. P.

Train Control Systems.
General Railway Signal Co
Union Switch & Signal Co

Tramways, Wire Rope.
American Steel & Wire Co

Transfer Tables.
American Bridge Co.
Industrial Brownhoist Corp
Nichols & Bro., Geo. P.

Transformers.
General Electric Supply Corp.
Westinghouse Elec. & Mfg. Co.

Trap Doors & Fixtures.
Tuco Products Corp.

Traps, Steam.
Johns-Manville Corp.

Treads, Bridge Floor.
Carnegie Steel Co.

Treatment, Water — (See Water Purifying Materials.

Truck Frames—(See Frames Truck).

Trucks, Oxy-Acetylene Supply.
Oxweld Railroad Service Co., The.

Trucks, Car and Locomotive
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works
Bettendorf Company, The
Birdsboro Steel Foundry & Machine Co.
Flexible Truck Co.
Franklin Railway Supply Co., Inc
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Standard Car Truck Co.

Trucks, Cast Steel Tender.
General Steel Castings Corp.

Trucks, Cast Steel, Electric Car.
General Steel Castings Corp.

Trucks, Cast Steel, Car and Locomotive.
General Steel Castings Corp.

Trucks, Electric Storage Battery.
Elwell-Parker Electric Co.

Trucks, Industrial.
Elwell-Parker Electric Co.

Trucks, Motor.
General Motors Truck Co
International Harvester Co.
Reo Motor Car Co.
White Co., The.

Trucks, Tender.
Flexible Truck Co.

Trucks, Trailer.
Franklin Railway Supply Co., Inc.

Tubes, Arch.
National Tube Co.

Tubes, Boiler.
Allegheny Steel Co.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Globe Steel Tubes Co.
National Tube Co.

Tubes, Boiler, Charcoal Iron
Bethlehem Steel Co.
Reading Iron Co.

Tubes, Staybolt.
Falls Hollow Staybolt Co.

Tubes, Tire.
Firestone Tire & Rubber Co.
Goodyear Tire & Rubber Co.

Tubing.
Aluminum Co. of America.

Tubing, Seamless Steel.
National Tube Co.

Tungsten Metal.
Vanadium Corp. of America.

Turbo Generators.
Electric Service Supplies Co.
General Electric Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co
Westinghouse Elec. & Mfg Co.

Turnbuckles.
American Bridge Co.
American Steel & Wire Co.

Turntable Tractors.
Nichols & Bro., Geo. P.

Turntables.
American Bridge Co.
Industrial Brownhoist Corp
Nichols & Bro., Geo. P.

Typewriter Ribbons.
Remington-Rand Business Service.

Typewriters.
Remington-Rand Business Service.

Uncoupling Device.
Hutchins Car Rfg. Co.

Undercrossings, Corrugated Iron.
Republic Steel Corp.

Underfloor Duct.
General Electric Supply Corp.

Underfloor Duct, Fibre and Metal.
Johns-Manville Corp.

Underframes, Cast Steel Tender.
General Steel Castings Corp.

Underframes, Cast Steel, Freight Car.
General Steel Castings Corp.

Underframes, Steel.
Bettendorf Co., The.
Pressed Steel Car Co.

Underground Conduit.
General Electric Supply Corp.

Upholstery, Car.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Valve Caps.
Schrader's Son, Inc., A.

Valve Gears, Locomotive.
Pyle-National Co.

Valves, Air Brake.
Westinghouse Air Brake Co.

Valves, Back Pressure Acetylene.
Oxweld Railroad Service Co., The.

Valves, Balanced Slide.
Hammett, H. G.

Valves, Blow-Off.
Bird-Archer Co., The.

Valves, Drifting.
Ardco Mfg. Co.

Valves, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Valves, Piston.
Franklin Railway Supply Co., Inc.

Valves, Pop, Safety & Relief.
Ashton Valve Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Valves, Throttle.
American Throttle Co., Inc.

Valves, Fire.
Schrader's Son, Inc., A.

Varnish Powder.
Aluminum Co. of America.

Varnishes.
General Electric Supply Corp.
Lowe Bros. Co., The.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Ventilators, Shop & Roundhouse.
Carey Co., Philip, The.
Johns-Manville Corp.

Washers.
National Malleable & Steel Castings Co.
Wine Railway Appliance Co.

Waterproofing Materials and Compounds.
Carey Co., Philip, The.
Johns-Manville Corp.
Lehon Co., The.

Water Purifying Materials & Compounds.
Bird-Archer Co., The.
Dearborn Chemical Co.

Water Softening & Purifying
Bird-Archer Co., The.
Dearborn Chemical Co.
Graver Tank & Mfg. Corp.
Permutit Co., The.

Weather Stripping.
Tuco Products Corp.

Wedges, Automatic.
Franklin Railway Supply Co., Inc.

Wedges, Journal Box.
American Steel Foundries
National Malleable & Steel Castings Co.
Pressed Steel Car Co.

Welding Machines, Acetylene.
Oxweld Railroad Service Co., The.
Westinghouse Elec & Mfg. Co.

Welding Machines, Electric.
General Electric Co.

Welding Materials.
Oxweld Railroad Service Co.
Franklin Railway Supply Co., Inc.

Welding Process.
Oxweld Railroad Service Co.

Welding Rods.
American Steel & Wire Co
General Electric Supply Corp.
Oxweld Railroad Service Co., The.

Welding Supplies.
General Electric Co.
Oxweld Railroad Service Co., The.

Welding and Cutting Apparatus—(See Cutting and Welding Apparatus).

Well Casings, Corrugated Iron.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Wheel Centers, Driving.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works.
Birdsboro Steel Foundry & Machine Co.
Edgewater Steel Co.
Hunt-Spiller Mfg. Corp.
Standard Steel Works Co.
Union Steel Casting Co.

Wheels, Car and Locomotive.
American Locomotive Co.
American Steel Foundries
Baldwin Locomotive Works.
Bethlehem Steel Co.
Carnegie Steel Co.
Edgewater Steel Co.
Griffin Wheel Co.
Illinois Steel Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Railway Steel Springs Co.
Standard Steel Works Co.

Wheels, Cast Iron, Chilled Tread.
Assn. of Mfrs. of Chilled Car Wheels.
Graybar Electric Co.
Griffin Wheel Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Wheels, Mine Car.
Carnegie Steel Co.
Edgewater Steel Co.
Griffin Wheel Co.
Mt. Vernon Car Mfg. Co
Standard Steel Works Co.

Wheels, Steel and Steel Tired.
American Locomotive Co.
American Steel Foundries.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
Lima Locomotive Works.
Railway Steel Spring Co.
Standard Steel Works Co.

Wheels, Wrought Steel.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Carnegie Steel Co.
Edgewater Steel Co.
Standard Steel Works Co.

Whistles.
Ashton Valve Co.

Whistles, Locomotive.
General Electric Co.
Westinghouse Air Brake Co.

Window Fixtures.
Tuco Products Corp.

Wire.
American Steel & Wire Co.
Kerite Insulated Wire & Cable Co.

Wire, Fence.
American Steel & Wire Co.

Wire, Insulated.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Co.
Graybar Electric Co.
Kerite Insulated Wire & Cable Co.

Wire, Rail Bond.
American Steel & Wire Co.
Graybar Electric Co.

Wire Rope Clips.
American Steel & Wire Co.

Wire Rope.
American Steel & Wire Co.

Wire, Telephone & Telegraph.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
Graybar Electric Co.

Wire, Welding.
American Steel & Wire Co.
Oxweld Railroad Service Co., The.

Wiring Appliances.
Pyle-National Co.

Wood, Treated.
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Wood, Preservative Treatment (Zinc Metal Arsenite).
Century Wood Preserving Co. (Div. Wood Preserving Corp.)
National Lumber & Creosoting Co.

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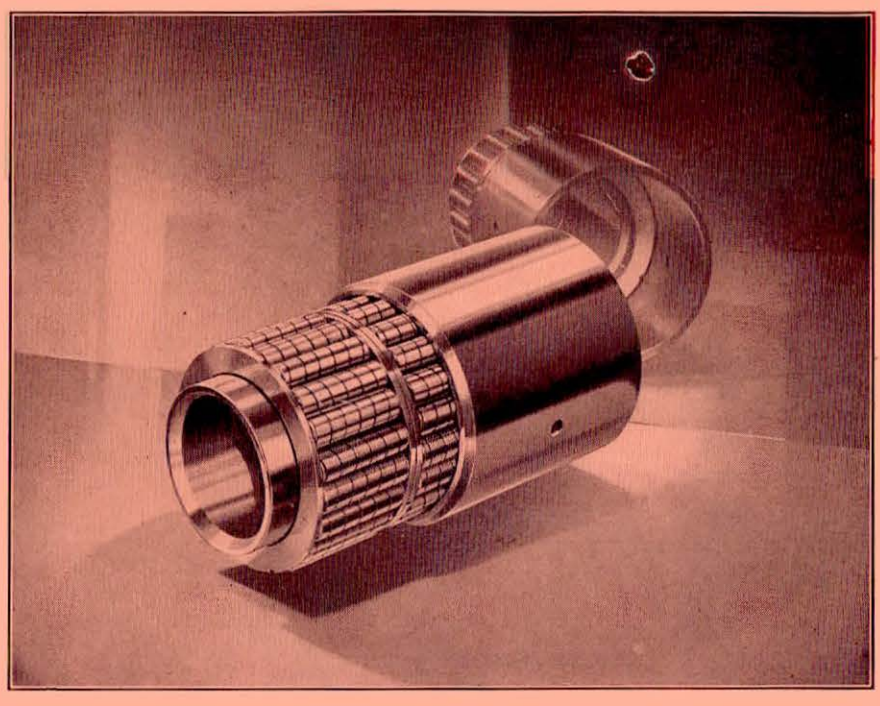

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Railroads in the early days built double-track lines not because traffic required two tracks but because of the unavoidable delays in single-track operation.

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▼▼▼

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UNION SWITCH & SIGNAL COMPANY
Swissvale, Pennsylvania

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79

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